Q C

A

Setting up markers

1, Display alignment waveform in normal way.

SIEMENS

2 Set Level to 1 line -6db.

3 Switch Sweep attachment to Manual Control

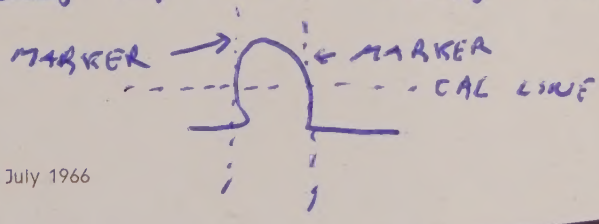
4 Adjust Man. Control so that the left hand Marker line corresponds with the lower pass band freq.

5 Adjust Man. Control so the right hand Marker line corresponds with the upper pass band freq.

LEVEL TRACER

Type Rel 3 D 346b 1a
with the Slide-in Chassis Types Rel 3 D 916 to 920, 928

6 Switch to Sweep - The filter under test being displayed should coincide with the left and right hand marker lines at the -6db cal line



Full Information

Rel gesamt 3 D 346b 1a En · Issue July 1966

DEPT. 105

SIEMENS & HALSKE AKTIENGESELLSCHAFT
WERNERWERK FÜR WEITVERKEHRS- UND KABELTECHNIK · MÜNCHEN

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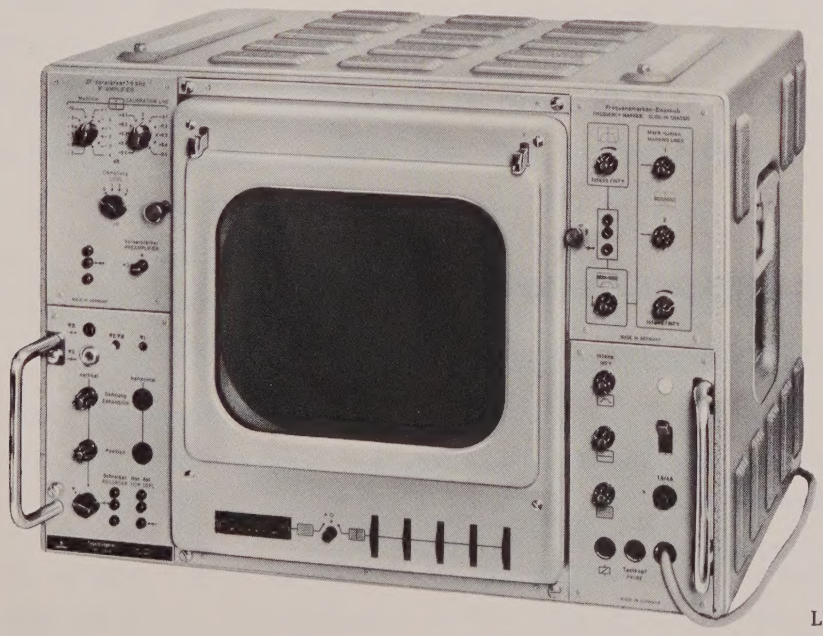
D E S C R I P T I O N

I. APPLICATION

The level tracer Type Rel 3 D 346, a high-grade receiving and display device, is part and parcel of a whole series of sweep measuring setups. Due to the exchangeable measuring slide-in chassis (input amplifiers) - for wideband measurements, slide-in chassis with different frequency ranges and sensitivities; for selective measurements, slide-in chassis for a preceding level meter - this detector can be employed for nearly all measuring tasks. The high measuring accuracies obtained with the level tracer are due to the large display screen, the high resolving power, and the recording method (line recorder) which permits level and frequency lines to be gated in electronically together with the measuring curve. The measuring accuracy is equal to that of the pointwise measuring method; due to the high resolving power it may even prove superior for various tasks.



LEVEL TRACER Type Rel 3 D 346b1a

II. ELECTRICAL DATA

A. Level Tracer Type Rel 3 D 346

Display size . . . . . 190 mm x 170 mm

Persistence time of the screen phosphor
(for a brightness drop to 1 %) . . . . . approx. 60 sec

Coordinate Grid

Frequency Markers (horizontal scale)
(with frequency marker slide-in chassis Type Rel 3 D 928)

Vertical lines . . . . . controlled by low-pass filter signal of the transmitting section

or modulated signal
with zero crossover . . . . . by displaying the high-pass filter signal of the transmitting section

In addition two static lines . . . . . continuously movable, can be calibrated with the respective frequency marker

Display sensitivity . . . . . full deflection for any sweep range that can be set on the transmitting section

additional expansion . . . . . approx. tenfold

Level (vertical scale)

Level reference line

adjustable in steps . . . . . see measuring slide-in chassis

Level lines, in parallel to the reference line,

capable of calibration with the latter,
continuously movable, optionally . . . . . up to 5

Level lines established by plug-in level-pattern sender . . . . . up to 8

Indication sensitivity, continuously variable from . about 10 to 150 mm/db

B. Level Tracer with the Measuring Slide-in Chassis

1. Wideband Amplifier Slide-in Chassis Type Rel 3 D 917

Frequency range . . . . . 10 kc/s to 15 (20) mc/s

Frequency response of the indication . . . . . ±1 %

Measuring range for model	db	N	dbm
as referred to the 0-db(N) reference line, from	-40 to -5 db	-4.5 to -1 N	-30 to +5 dbm
adjustable in steps of . . .	5 db	0.5 N	5 db each

Level reference line

adjustable from . . .	+1.5 to -10.5 db	+0.15 to -1.05 N	+1.5 to -10.5 db
in steps of	0.1 and 1 db	0.01 and 0.1 N	0.1 and 1 db

Input

unbalanced, coaxial . . . . . jack 2.5/6

input impedance Z = ... 75 Ω

2. Wideband Amplifier Slide-in Chassis Type Rel 3 D 918

Frequency range . . . . . 200 c/s to 1.6 mc/s

Frequency response of the indication . . . . . ±1 %

Measuring range for model	db	N
as referred to the 0-db(N) reference line, from	-60 to +10 db	-7 to +1 N
adjustable in steps of	5 db	0.5 N each

Level reference line

adjustable from	+1.5 to -10.5 db	+0.15 to -1.05 N
in steps of	0.1 and 1 db	0.01 and 0.1 N

Input

unbalanced, coaxial . . . . . jack 1.6/5.6

input impedance . . . . . high (>>600 Ω)

termination . . . . . can be plugged into parallel jack

3. Wideband Amplifier Slide-in Chassis Type Rel 3 D 919

Frequency range . . . . . 30 c/s to 30 (100) kc/s

Frequency response of the indication . . . . . ±1 %

Measuring range for model	db	N
as referred to the 0-db(N) reference line, from	-40 to +20 db	-4.5 to +2 N
adjustable in steps of	5 db	0.5 N each

Level reference line

adjustable from	+1.5 to -10.5 db	+0.15 to -1.05 N
in steps of	0.1 and 1 db	0.01 and 0.1 N

Input (unbalanced)

input impedance . . . . . high (>>600 Ω)

termination . . . . . can be plugged into parallel jack

4. IF Amplifier Slide-in Chassis Type Rel 3 D 916

Frequency range . . . . . 1 to 5 kc/s

Input sensitivity

reconnectable to . . . . . 0 and +20 db (0 and +2.3 N)

additionally three attenuation steps of . . . . . 1 db (0.1 N) each

Level reference line

adjustable from . . . . . +1.5 to -10.5 db (+0.15 to -1.05 N)

in steps of . . . . . 0.1 and 1 db (0.01 and 0.1 N)

Further data given by the . . . . . preceding selective level meter

5. Logarithmic IF Amplifier Slide-in Chassis Type Rel 3 D 920

Input frequency, swith-selected . . . . . 50 and 100 kc/s

Level indicating range . . . . . 100 db (10 N)

Level reference line

adjustable from . . . . . 0 to -100 db (0 to -10 N)

in steps of . . . . . 10 db (1 N)

Further data given by the . . . . . preceding selective level meter

C. Power Supply . . . . . 110, 130, 220(230), 240 v ±10 %, 47 to 60 c/s, approx. 180 va

III. FUNCTIONING AND LAYOUT

A. Survey (Fig.1)

In the level tracer the measuring quantity is displayed as a closed trace on the screen of a cathode-ray tube. Exchangeable measuring slide-in chassis differing in their frequency ranges and sensitivities are used for adapting the level tracer to different measuring tasks and frequency ranges.

The picture tube used has an especially large display screen. The long persistance of its phosphor ensures a constantly visible screen trace even at very slow sweep rates.

The display method is nearly the same as that customarily used in TV engineering; however, the lines run in a vertical direction and on the initially dark screen the cathode ray is unblanked point by point, as need arises, to display the measuring curves and grid lines. A level scale consisting of horizontal lines can be established by means of a calibrated, variable level reference line; this level scale can comprise up to five level lines (when a plug-in level-pattern sender is used, up to eight lines). Several frequency lines can furthermore be gated in over the full screen height. Many sources of faults, including parallax, can be avoided by this simultaneous presentation of the measuring curve and the auxiliary lines.

The input signal is amplified and rectified in the measuring slide-in chassis of the level tracer. These slide-in chassis furthermore contain voltage dividers for setting the sensitivity and the level reference line.

For measuring small attenuation differences over large frequency ranges (audio, carrier-frequency ,for instance on wideband amplifiers, cables or separating filters, the following wideband amplifiers are available, viz. Type Rel 3 D 917 (frequency range of 10 kc/s to 17 (20) mc/s), Type Rel 3 D 918 (frequency range of 200 c/s to 1.6 mc/s), and Type Rel 3 D 919 (frequency range of 30 c/s to 30 (100) kc/s). For selective measurements a selective level meter with an automatic tuning system precedes the level tracer. The IF measuring slide-in chassis Type Rel 3 D 916 (1 to 5 kc/s) or the logarithmic slide-in chassis Type Rel 3 D 920 (50 or 100 kc/s) adapt the IF output of the level meter to the level tracer.

Frequency markers are required for evaluating the measuring curves. The signals for the frequency markers are supplied by the transmitting section of the measuring setup. A pulse signal extracted via a low-pass filter or a

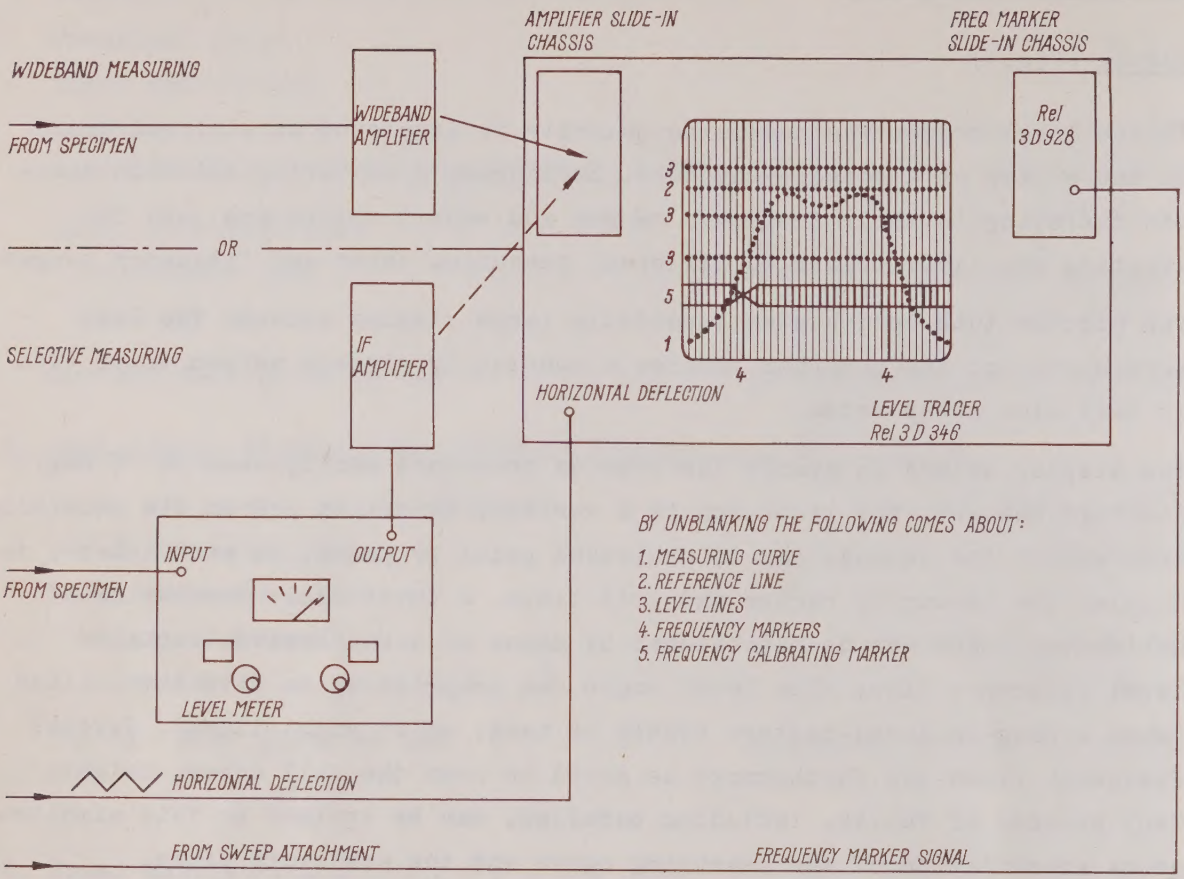


FIG.1 RECEIVING SECTION, EQUIPMENT SURVEY AND TYPICAL SCREEN DISPLAY

frequency band with an amplitude decreasing around zero-beat crossover (the frequency-marker point) - a high-pass signal - is optionally available.

The pulse signal is amplified, limited and rectified in the frequency marker slide-in chassis. The pulse established by these means unblanks a frequency line running in the vertical direction on the screen. For an exact determination of the frequency, the width of the frequency line must be in a reasonable relation to the width of the swept band. If the frequency line is not exact enough because the sweep range is too low or the sweep rate too high, the high-pass filter signal can be used. The band with the frequency marker point indicated by a constriction is then displayed on the screen.

Two horizontal lines which can be moved can be additionally displayed by pulses generated in the frequency marker slide-in chassis independently of the signal to be measured. They can be calibrated with the respective frequency marker and then be used as a frequency scale.

The vertical indicating range can be expanded so that a sensitivity of about 150 mm/dB results on the screen. This high sensitivity is, for instance, of advantage when minute level variations are to be measured by means of the comparison method. The alternate-presentation swith Type Rel 3 B 946 is used for this purpose. In synchronism with the sweep frequency it alternately reconnects the input of the device from the specimen under test to a comparison standard (for details see Attachments p. 1.27).

For often recurring measuring tasks, for instance checking numerous identical specimens, plug-in level pattern senders (Type Rel 3 B 945) are available with which up to eight fixed-set level lines can be displayed (for details see Attachments p.1.26).

B. Displaying Method

In the vertical direction the cathode ray is deflected by a 20-kc/s sawtooth voltage generated in the basic unit and in the horizontal direction by a triangular voltage variable between 0.01 c/s and 25 c/s and supplied from the transmitting section. The resulting line pattern running in a vertical direction is usually not visible on the picture tube as the cathode ray is blanked and only those points are unblanked where the lines intersect with the measuring curve or the auxiliary lines.

The path of the electron ray on the screen is shown in a simplified manner in Fig.2. The measuring curve and the auxiliary lines result from a long string of closely adjacent points within the line pattern.

At a deflecting frequency of 20 kc/s and a sweep frequency of 1 c/s, each curve of one sweep consists of 10,000 dots. Even at the highest sweep frequency of 25 c/s, 10,000 : 25 = 400 points per trace are still displayed.

The vertical position of each beam-gating point is determined by a comparator. It compares the amplitude of the voltage to be displayed with the rising edge of the 20-kc/s sawtooth voltage. The voltage transient resulting in case of voltage equality is differentiated several times and amplified. A short pulse which unblanks the cathode ray of the picture tube for a fraction of a vertical deflecting period thus comes about so that one dot is displayed. For displaying a vertical line (frequency marker), beam gating lasts a least for the duration of a vertikal deflecting period (Fig.2).

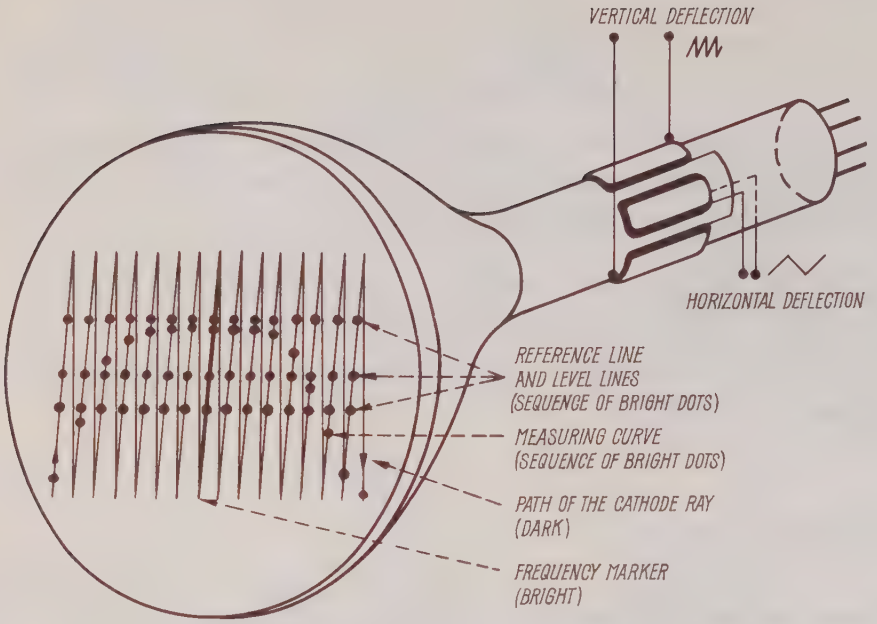


FIG.2 DISPLAY METHOD, PATH OF THE CATHODE RAY

The functioning of a comparator can be seen from Figs.3 and 4. The 20-kc/s sawtooth voltage of the signal to be measured is available at A, and the rectifier voltage at B. As long as the potential at A is below the potential at B, the diode remains blocked; the potential of B is at C.

When the potential at A exceeds the potential at B the diode becomes conducting, and the voltage at C increases according to the curve shown. The instant t1, at which the voltage starts rising, depends on the magnitude of the voltage at B (t1 = f (E)). By differentiating this function a voltage transient comes about at D; by further differentiation, the beam-gating pulse at E.

The second differentiation is effected in a differentiating amplifier whose output circuit - a pulse-forming circuit - supplies the beam-gating pulse.

A separate comparator circuit is required for each auxiliary (level) line running in the horizontal direction. The time sequence of the pulses within the rising edge of the 20-kc/s sawtooth voltage determines the position of the dots displayed in the vertical direction, the horizontal deflecting voltage their position in the horizontal direction (Fig.5).

The comparator circuits for the level lines feed into a common load resistor R (Fig.6). A staircase voltage corresponding to the voltages set at the potentiometers comes about across R; it is converted into a sequence of pulses by the common differentiating amplifier.

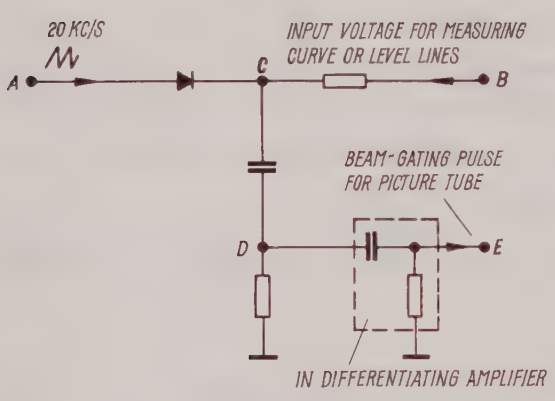


FIG.3 CIRCUIT DIAGRAM OF THE COMPARATOR

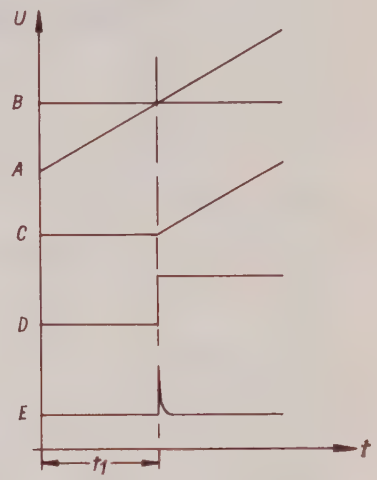


FIG.4 PULSE TIME SCHEDULE

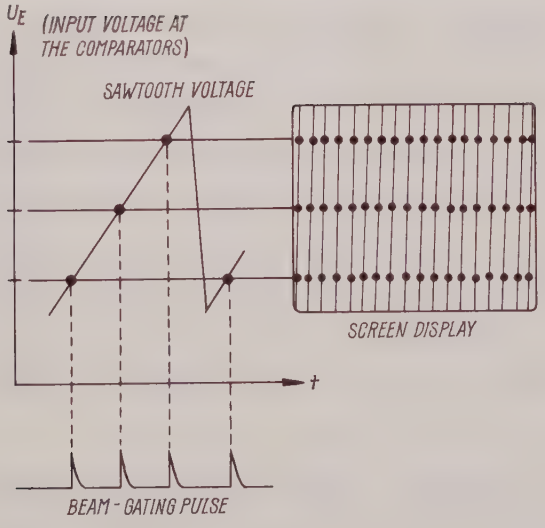


FIG.5 TIME FUNCTION OF THE BEAM-GATING PULSES

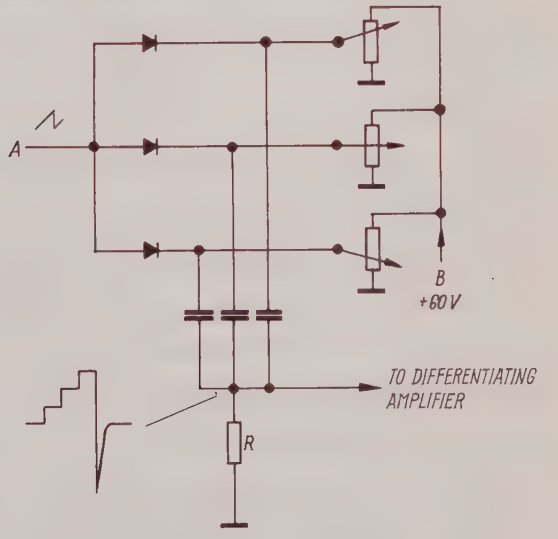


FIG.6 CIRCUIT DIAGRAM OF THE COMPARATORS FOR THE LEVEL LINES

gesamt 3 D 346 En

C. Layout of the Devices

1. Overall Layout (Fig.7)

The input voltage amplified and rectified in the measuring slide-in chassis reaches first a DC amplifier whose gain can either be calibrated to the sensitivity given by the level reference line or set for further expansion (up to tenfold) of the measuring signal. A comparator translates the respective amplitude value of this DC voltage into a function of time. The further differentiation is effected in the differentiating amplifier for the measuring curve. The signal voltage, translated in this way to a pulse sequence, reaches the cathode of the picture tube via an amplifier. The pulses unblank dots of the horizontally running blanked lines. The closely strung points result in the measuring curve.

For measuring the curve in the vertical direction, up to five continuously settable level lines can be simultaneously displayed on the screen. Here displaying is effected in the same way, viz. by means of beam-gating pulses (comparators 3 to 7, differentiating amplifier 3). The comparison voltages required by the comparators are tapped at the potentiometers P1 and P5 which are fed by a stabilized voltage. The magnitudes of the comparison voltages can be varied with P1 and P5 so that the level lines can be moved over the entire height of the screen. A plug-in level-pattern sender Type Rel 3 B 945 can be connected instead of the built-in comparators for the level lines. Up to eight level lines which can be fixed-set and thus calibrated for recurring measuring tasks can be generated with this sender. In addition to the level lines a level reference line (measuring line) is displayed via a further comparator and differentiating amplifier (comparator 2, differentiating amplifier 2). This reference line can be moved in calibrated steps through the voltage dividers in the amplifier slide-in chassis. The continuously movable level lines can be calibrated with this reference line.

For frequency marking the low-pass filter signal of the transmitting section is amplified, limited, and rectified in the frequency marker slide-in chassis. The pulse formed in this way reaches the cathode of the picture tube and unblanks one or several lines so that a frequency line running in the vertical direction results.

For frequency marking by means of the high-pass filter signal of the transmitting section (frequency-modulated band with a constriction at the frequency marker point), this signal must be converted into a function of time

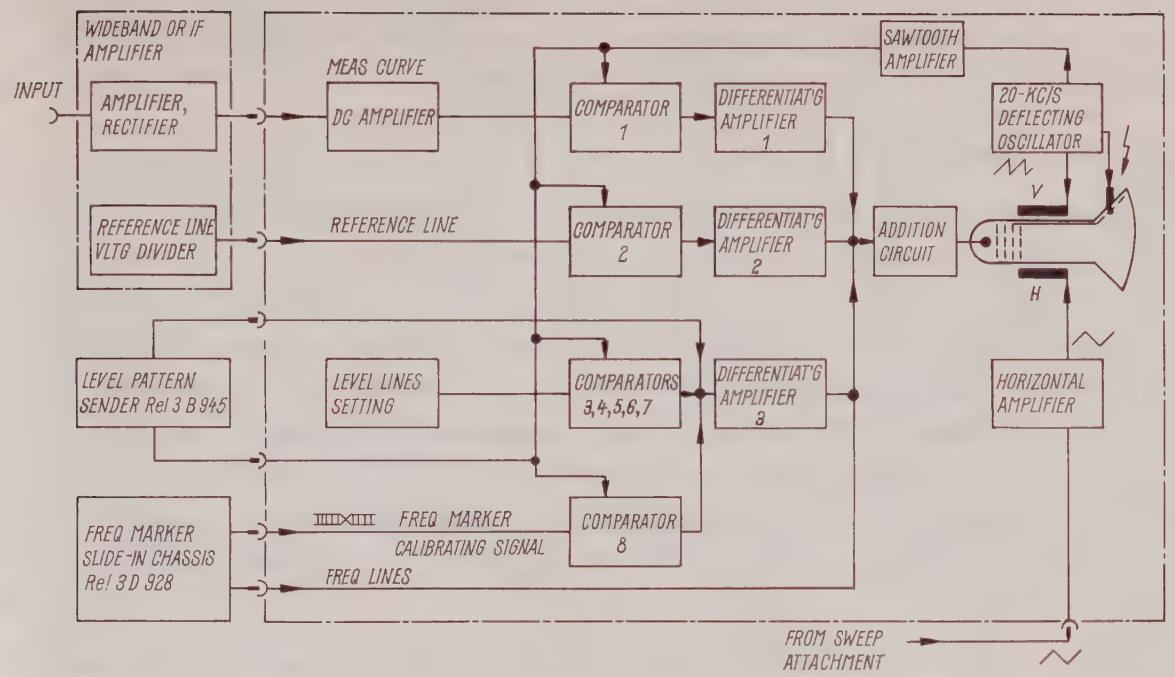


FIG.7 BLOCK DIAGRAM OF THE LEVEL TRACER

corresponding to the time-base frequency (20 kc/s) for display on the screen. A further comparator (comparator 8) extracts the beam-gating pulses from the respective instantaneous value of the high-pass signal and passes them on to the differentiating amplifier 3.

In addition to the frequency markers derived from the signals of the transmitting section, a comparison circuit in the frequency marker slide-in chassis generates two pulses in dependence on the horizontal deflection. On the screen these pulses unblank two horizontal lines which can be moved independently of each other over the entire screen width. These lines calibrated with the frequency line or the "zero crossover" of the high-pass filter signal allow marking at two further frequencies.

The sawtooth current required for the vertical deflection in the deflecting coil is supplied by a 20-kc/s oscillator in the high-voltage section. Via an amplifier the 20-kc/s sawtooth voltage is furthermore applied to the comparators as a comparison voltage. The high voltage (12 kv) for the picture tube is supplied by the line transformer from the high inductance voltage resulting during the sawtooth return sweep.

The control voltage from the sweep attachment of the transmitting section is used for the horizontal deflection. In the horizontal amplifier this balanced triangular voltage wave controls the current for the deflecting coil.

2. DC Amplifier Type Rel 35 D 434

For voltage comparison in the comparators, the voltage which is to be measured and is supplied by the wideband or IF amplifier does not suffice for the high measuring accuracy required. It is therefore further amplified in the DC voltage amplifier. Its gain must be very constant as gain variations would shift the measuring curve displayed on the screen with respect to the constant level lines which are adjusted independently of the DC amplifier and result in measuring errors. The required stability is obtained by a degenerative amplifier in a balanced pushpull configuration and carefully regulated supply voltages. The simplified layout of the DC amplifier is depicted in Fig.8.

The cathodes of the tubes 9 and 10 at the input have a potential of about -170 v. A voltage of about -160 v reaches the grids via the potentiometer R8 and the balancing resistors in the rectifier circuit of the amplifier slide-in chassis. The closed-circuit current of the tubes 9 and 10 for the calibration of the measuring curve to the ∞ -line is fixed by P9 "▼I" with the aid of an extra voltage. A stabilized voltage of the 20-kc/s oscillator, which is rectified via the diodes Gr1 and Gr2, is used for this purpose. The gain of the DC amplifier is determined by the voltage degeneration (R20 and R23) and the resistance combination between the cathodes of tubes 9 and 10.

To allow level measurements to be made with the aid of a level scale established with the level reference line and the level lines, the gain must be brought to an exactly defined value. To this end a calibrating voltage is applied to the input of the measuring slide-in chassis, and the displayed line is calibrated to the level reference line of 0 db by adjusting the gain with potentiometer P11 "▼ II, III" in the DC amplifier.

In the second position of switch S1 ("expansion vertical") it is possible to decrease the degeneration continuously with P10 so that the gain and thus the display variation per db increase as much as tenfold. It is thus possible to read very small level increments down to about 0.01 db.

By shifting the position of the display with the aid of potentiometer P8 in the horizontal amplifier it is possible to bring the expanded measuring curve or that expanded section that is of interest back on the screen again.

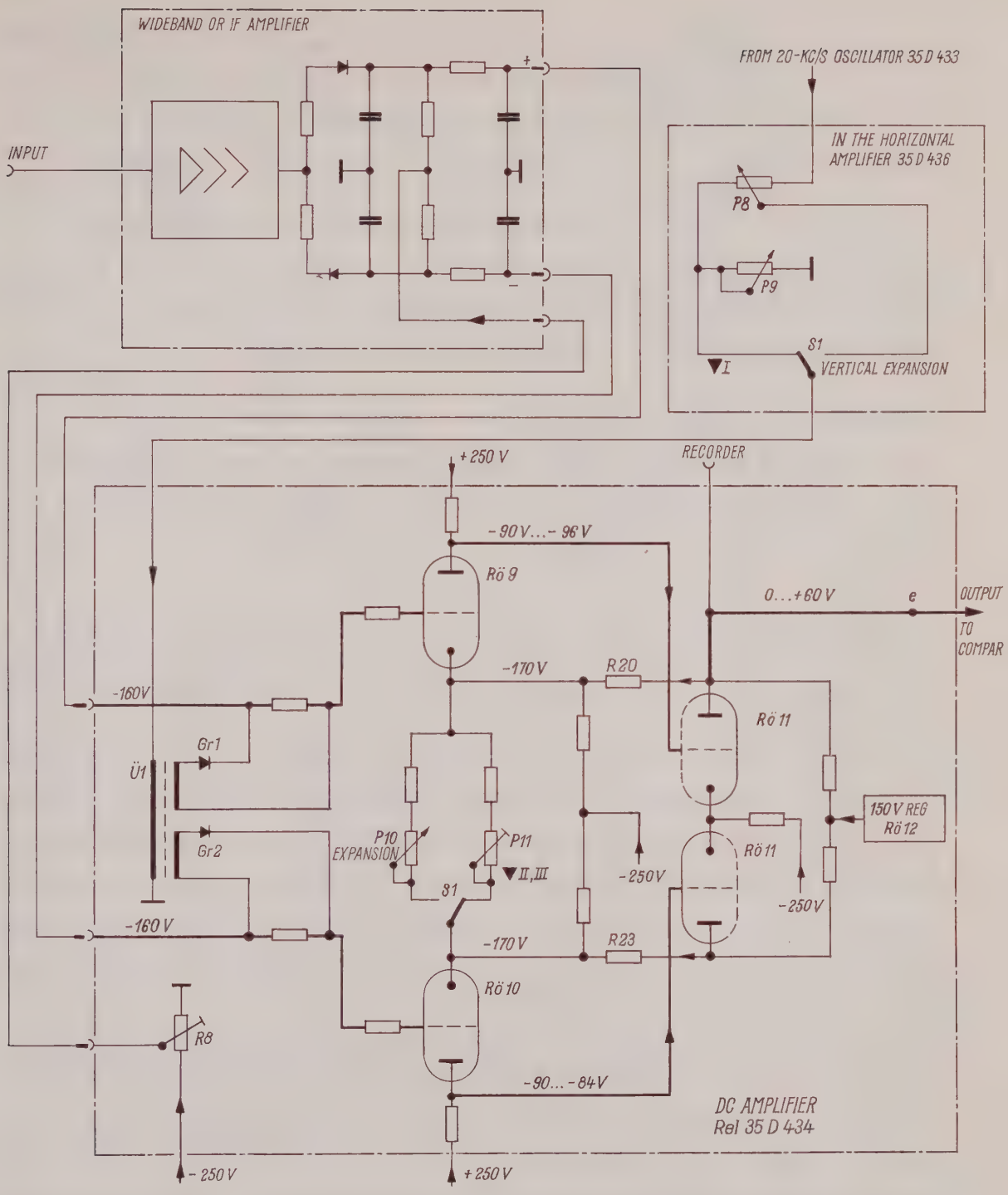


FIG. 8 BASIC CIRCUIT DIAGRAM OF THE DC AMPLIFIER

3. Sawtooth Amplifier

The second voltage required for the voltage comparison in the comparators is the 20-kc/s sawtooth voltage furnished by the deflecting oscillator. Due to the changing load brought about by the comparators (see Operation of the Comparators page 1.8) the sawtooth amplifier precedes the comparator as an impedance converter (tube 2, tube 3). It operates as a degenerative DC amplifier with two parallel-connected cathode-follower output stages.

Circuit configuration: see overall circuit diagram Rel str 3 D 346 En in the Circuit Data Folder. The sawtooth amplifier and the horizontal amplifier are both accommodated in the subassembly Type Rel 35 D 436.

4. Horizontal Amplifier

The horizontal amplifier furnishes the current for the horizontal deflecting coils of the picture tube. The triangular voltage wave generated in the sweep attachment controls this amplifier. A simplified circuit of this amplifier is depicted in Fig.9.

The triangular voltage wave is available at the grid of a buffer stage (grounded-anode stage); from the cathode it reaches a DC amplifier equipped with transistors via the voltage divider P7. The magnitude of the voltage and thus an expansion of up to ten times the screen width can be set with P7. In order to be able to display each partial section on the screen in the case of horizontal expansion, a DC voltage is applied to the grid of the first tube in addition to the triangular wave; this voltage is derived from the regulated 20-kc/s voltage and can be set with P6.

A limiter circuit is interposed in front of the first transistor; it prevents overmodulation of the amplifier, i.e. it cuts off any deflection beyond the screen for a set expansion.

Since the transistors of the DC amplifiers are metallically coupled, the feeding voltages of the individual transistors must be stacked. This stacking is effected by the Zener diode for transistor 2 in the emitter, and for transistor 3 in the base.

The current of the third transistor is made degenerative via the common emitter resistance (R18, 19) of the stages Ts1 and Ts3.

The magnetizing current for the deflecting coils is supplied by the two power transistors Ts3 and Ts5. The currents of both transistors pass the deflecting

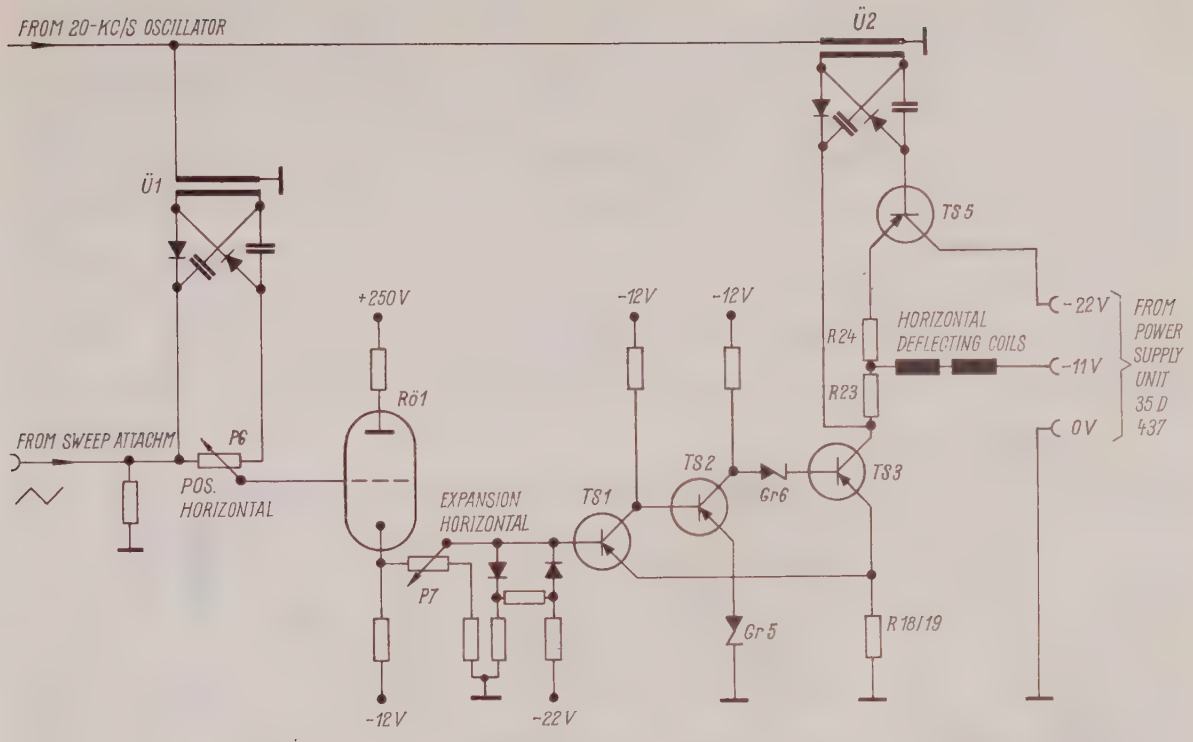


FIG.9 BASIC CIRCUIT DIAGRAM OF THE HORIZONTAL AMPLIFIER

coils in opposite directions and their sum is constant. If the two currents are equal, they offset one another in the coil and the cathode ray is not deflected in the horizontal direction.

When the collector current of transistor Ts3 increases due to the drive signal, the transistor Ts5 is driven in the opposite sense by this signal and its current decreases. Vice versa, the current of this transistor increases when the drive signal decreases. The transistors Ts4, 6, 8, and 9 not shown in the simplified circuit diagram (see Rel str 3 D 346 in the circuit data section) stabilize the supply voltages.

5. Differentiating Amplifiers (Fig.10)

The pulse sequence derived from the input voltage in the comparator reaches a differentiating amplifier. It is amplified and further differentiated in several stages by current degeneration at the low frequencies.

The anode circuit of the last stage includes a resonant circuit for the final pulse shaping. This circuit operates as follows:A variable bias with which the

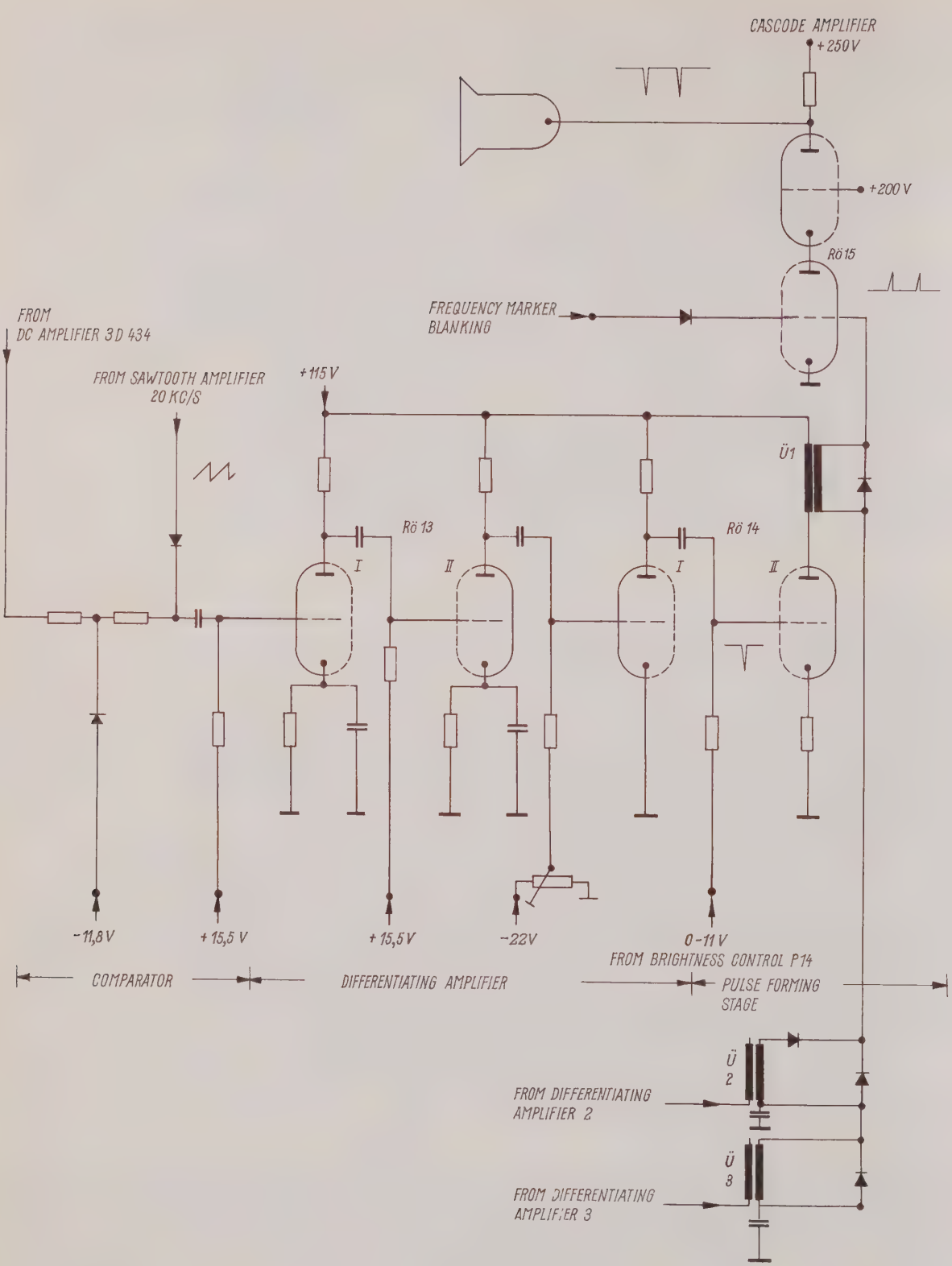


FIG.10 BASIC CIRCUIT DIAGRAM OF THE DIFFERENTIATING AMPLIFIER

magnitude of the no-signal anode current can be set is available at the grid of the tube (tube 14, section II). The negative pulse supplied by the preceding stage suppresses the no-signal anode current and thus gives rise to an oscillation in the anode tuned circuit. The frequency of the signal is determined by the inductance and residual capacitance of the coil. Due to a diode connected across the resonant circuit only the first positive alternation comes about and the negative alternation is short-circuited. The resonant circuit is thus dampened to such an extent that practically only a positive pulse comes about. The magnitude of this pulse depends on the magnitude of the no-signal anode current and is decisive for the brightness of the luminous spot.

It must be possible to make the three line types to be represented. viz. the measuring curve, the level reference line (measuring line), and the level lines, coincide for the measurement or the calibration, i.e. they must be independent of one another in their time of origin. Separate differentiating amplifiers are therefore required for the three line types. Each of the three line types can thus also be displayed with a different degree of brightness; this contributes considerably to the clarity of the display.

Only the pulse forming stages of all three differentiating channels are combined. From here the pulses are passed on to a cascode amplifier and subsequently to the cathode of the picture tube.

6. High-voltage Section (Fig.11)

A multivibrator generates the 20-kc/s sawtooth wave which is required for several purposes. The following "Scanning-line Final Tube" (Rö6, E 236 L) supplies the current for the scanning-line transformer. This scanning-line transformer has output coupling windings for the vertical deflection of the picture tube, for the sawtooth amplifier, supplying the voltage for the comparators, for the return sweep blanking, and the calibrating voltages. The high-voltage for the picture tube comes about via a high-voltage winding connected to a rectifier tube (Rö8, EY 86). A diode (Rö7, PY 81) furthermore increases the anode voltage for the scanning-line final tube by the voltage peak coming about during the line fly-back.

A regulating stage (Rö5, CCa) whose output voltage regulates the operating point of the line final tube (Rö6) provides a high stability for all voltages derived from the high-voltage section.

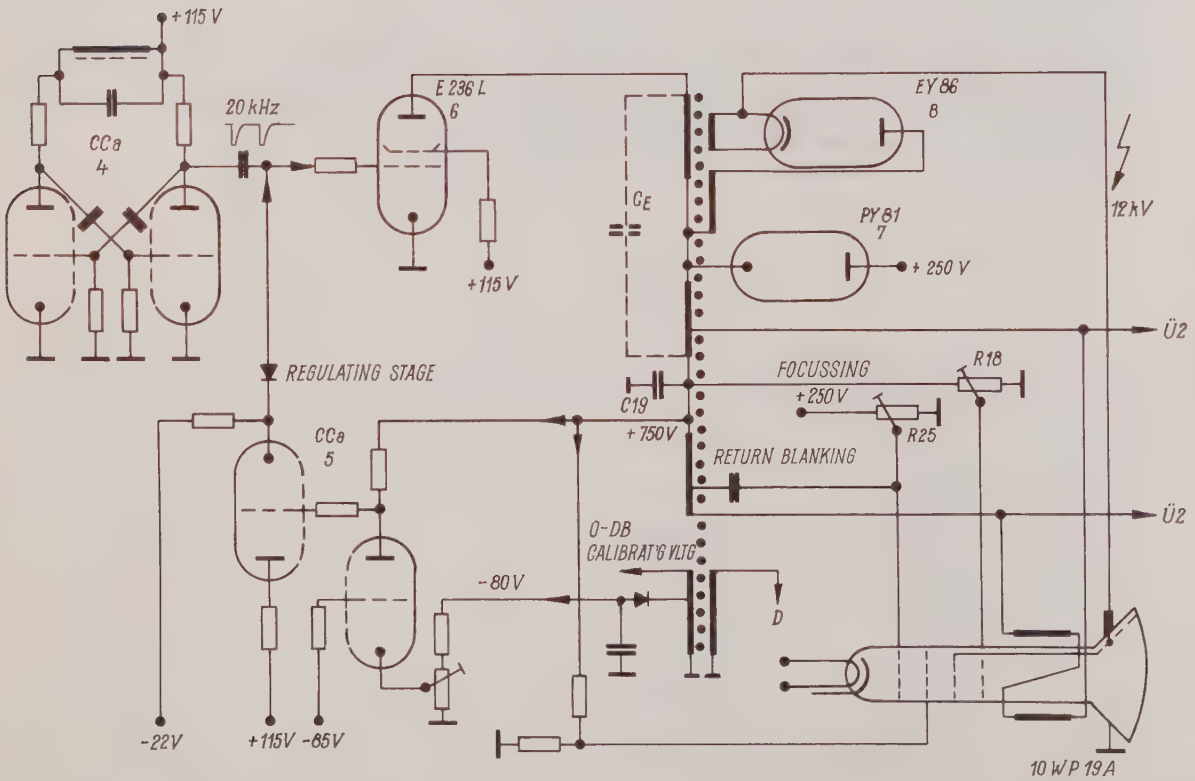


FIG.11 BASIC CIRCUIT DIAGRAM OF THE HIGH-VOLTAGE SECTION

D. Measuring Slide-in Chassis

Several wideband and IF amplifier slide-in chassis are available for adapting the level tracer to the measuring tasks. According to their frequency and level they are allotted to the main fields of application and are suited for the corresponding sweep measuring setups.

1. Wideband Amplifier Slide-in Chassis

a. Wideband Amplifier of 10 kc/s to 17 mc/s Type Rel 3 D 917

This amplifier is above all provided for the carrier-frequency sweep measuring setup Type Rel 32 M 701 (10 kc/s to 15 mc/s). It is suited for measuring small attenuation differences, for instance of amplitude/frequency responses of wideband amplifiers or the pass-band distortion of filters. An essential characteristic is the low frequency response of the amplitude (± 1 % throughout the frequency range). The layout of this amplifier is depicted in Fig.12.

From the output of the specimen under test the voltage to be measured is applied to the amplifier via the built-in attenuator (Z = 75 Ω). The attenuation can be set from 0 to 35 db (0 to 3.5 N) in seven steps of 5 db (0.5 N) each. The six-stage amplifier which follows is equipped with transistors of the Type 1 N 1143. It has a gain of 40 db (4.5 N); a measuring range of -5 to -40 db (-1 to -4.5 N) thus results for full deflection on the level tracing receiver.

A very low amplitude response of the amplifier throughout the frequency range is ensured by the circuit configuration selected, viz. with degeneration over three stages at a time, the regulated supply voltages and the uniform and exact layout (printed circuitry). The output voltage is taken at the emitter of transistor 6, rectified, and applied to the DC amplifier in the level tracer via connector strips.

The time constant and thus the build-up times of the detector circuit can be switched in order to meet the different requirements which are due to the large variable ranges for the sweep and measuring frequencies.

A divider fed from a stabilized voltage source can be reconnected for setting the level reference line in eleven steps of 1 db (0.1 N) and ten steps of 0.1 db (0.01 N) by means of the switches S2 and S3 (not shown in the illustration, see overall circuit diagram Rel str 3 D 917 En). Due to this voltage that can be set in steps and the level reference line (measuring line) controlled by it, a calibrated measuring scale can be established within the

measuring range or the displayed curve can be directly measured.

b. Wideband Amplifier of 200 c/s to 1600 kc/s Type Rel 3 D 918 (Fig.13)

This amplifier is suited for the carrier-frequency sweep measuring setup of 200 c/s to 1600 kc/s Type Rel 33 M 704 for measuring small attenuation

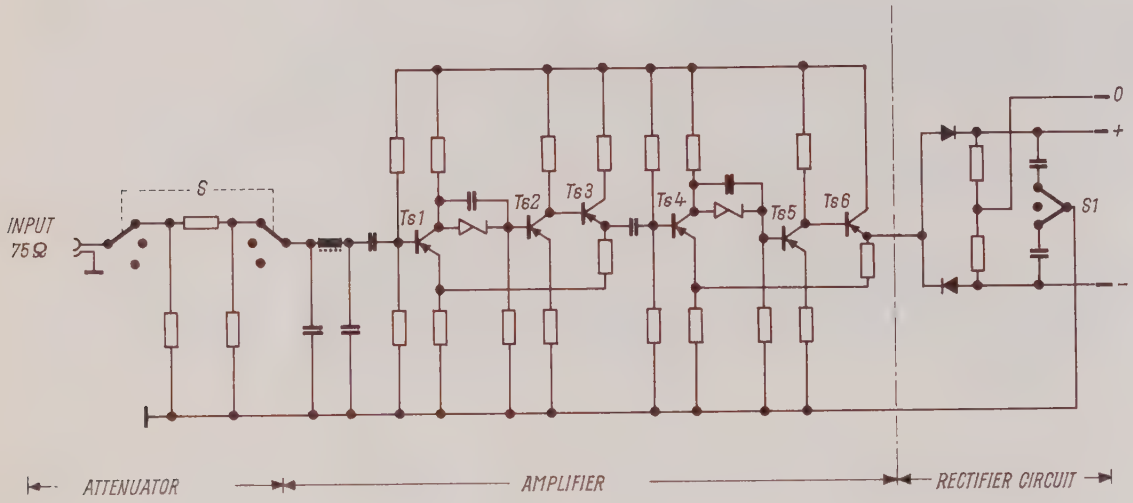


FIG.12 BASIC CIRCUIT DIAGRAM OF THE WIDEBAND AMPLIFIER Type Rel 3 D 917

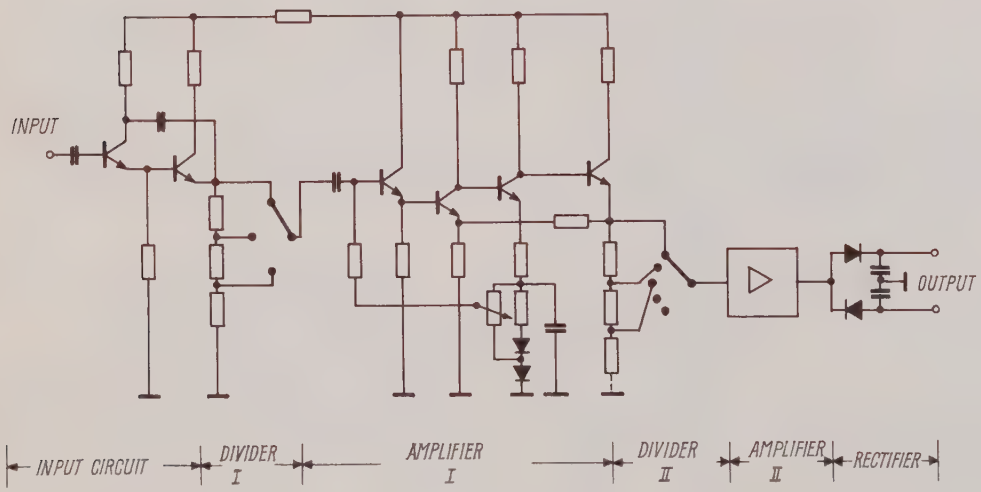


FIG.13 BASIC CIRCUIT DIAGRAM OF THE WIDEBAND AMPLIFIER Type Rel 3 D 918

differences. It is characterized by a small amplitude response within its transmission range. The impedance of the unbalanced input is high. A termination can be connected to a parallel jack. Via a plug-in balancing transformer it is possible to carry out measurements on balanced specimens up to a frequency of 600 kc/s.

A two-stage input circuit equipped with transistors is followed by a voltage divider reconnectable in two 20-db steps, the voltage divider in turn by a four-stage amplifier also equipped with transistors. A further voltage divider provided with six 5-db steps supplements the sensitivity switching circuit so that the measuring range (as referred to the 0-db (N) reference line) can be set from -60 to +10 db or from -7 to +1 N (in the case of the neper model) together with the 20-db divider which is ganged with the 5-db divider.

In a second wideband amplifier (having the same circuit configuration as the first amplifier) the voltage of the divider output is raised to the level required for the DC amplifier in the level tracing receiver and rectified via two diodes connected in pushpull. The time constant of the rectifier circuit can be reconnected for adaptation to the respective sweep frequency and the lowest measuring frequency.

The degenerative amplifiers which are temperature compensated and fed by regulated voltages provide for a high measuring accuracy due to the high stability and frequency independence of the gain.

In this slide-in chassis the level reference line can be set between +1.5 and -10 db (+0.15 and -1.05 N).

c. Wideband Amplifier of 30 to 30,000 c/s Type Rel 3 D 919

For wideband measurements this amplifier can be used with the audio sweep measuring setup Type Rel 33 M 703 (frequency range: 30 to 30,000 c/s) and the level meter Type Rel 3 D 342.

The layout is approximately the same as that of the amplifier slide-in chassis Type Rel 3 D 918. The measuring range for full deflection on the level tracing receiver extends from -40 db to +20 db (-4.5 N to +2 N) and can be set in steps of 5 db (0.5 N).

The impedance of the unbalanced input is high; terminations can be connected to a parallel jack. Measurements on balanced specimens can be effected via a balancing transformer.

On this amplifier slide-in chassis the level reference line can be set between +1.5 and -10.5 db.

2. IF Amplifier Slide-in Chassis

a. IF Amplifier of 1 to 5 kc/s Type Rel 3 D 916 (Fig.14)

The amplifier matches to the level tracer the outputs of the selective level meters of the 15-mc/s sweep measuring setup (Type Rel 32 M 701) and the 1.6-mc/s sweep measuring setup (Type Rel 33 M 704). When voltages of other frequencies could falsify the measuring result and when high sensitivity of the selective level meter is required, it is advisable to employ the selective measurement mode.

Via a switched input divider (three steps of 1 db (0.1 N)) each the converted measuring voltage reaches a cathode follower consisting of two parallel-connected tube sections, from where it is passed on to a rectifier circuit via a transformer and then to the DC amplifier of the picture receiver via connector strips.

The preamplifier (amplification approx. 10), which can be turned on with switch S4, is provided for the level meter Type Rel 3 D 344 of the sweep measuring setup Type Rel 33 M 704 as this meter supplies a lower IF voltage.

This slide-in chassis also includes two voltage dividers for the level reference line whose functioning and layout are identical (see circuit diagram Rel str 3 D 916 En).

b. Logarithmic Slide-in Chassis 50/100 kc/s Type Rel 3 D 920 (Fig.15)

This measuring slide-in chassis is suited for measurements on specimens with great attenuation differences. It can be connected to level meters that have a 50-kc/s or 100-kc/s IF output, e.g. Type Rel 3 D 354.

The voltage to be measured is amplified in ten cascaded stages; the gain per stage is 10 db. Via a special winding of the output transformer (Fig.16) the voltage to be measured also reaches from each stage a rectifier circuit whose output voltage is limited by a Zener diode. The DC voltage outputs are connected in series so that the DC voltages of all stages add up. This DC voltage reaches the DC amplifier of the level tracer via a reconnectable time-constant network. Due to the stepwise limitation a logarithmic display over a range of 100 db results on the screen.

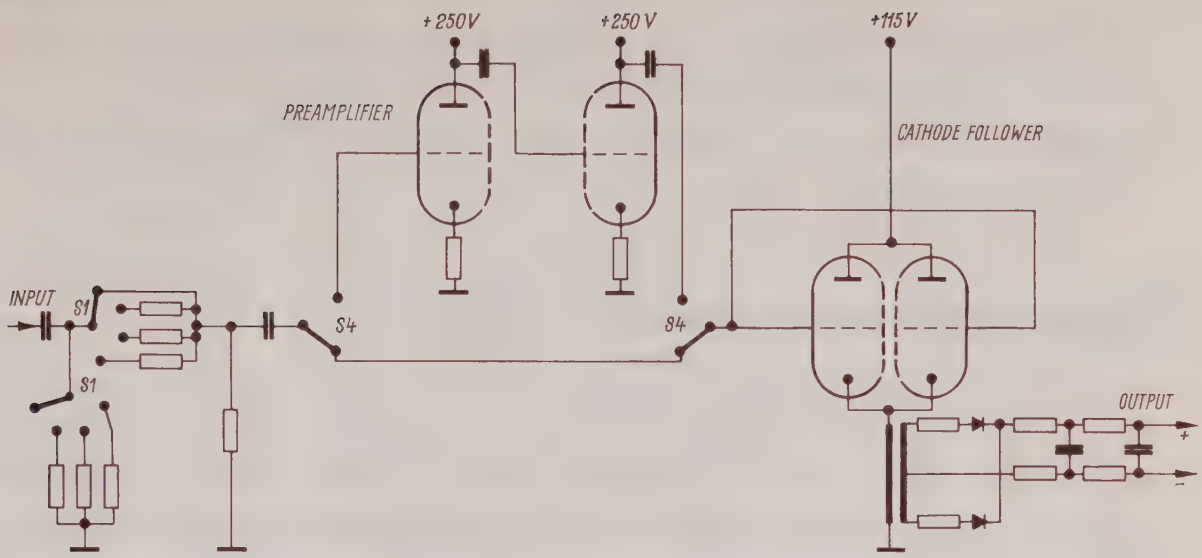


FIG.14 BASIC CIRCUIT DIAGRAM OF THE IF AMPLIFIER Type Rel 3 D 916

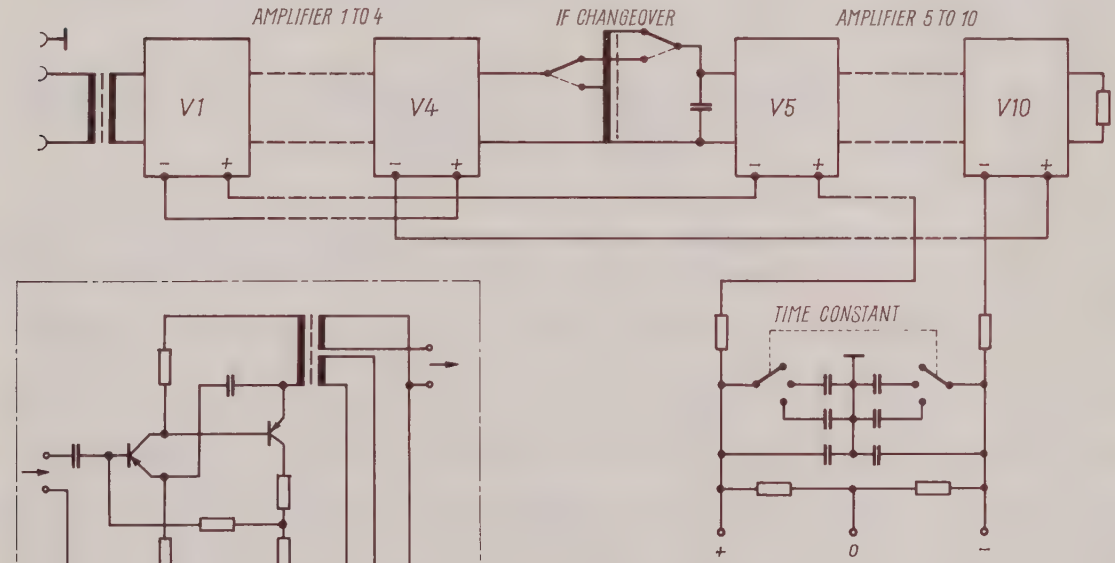


FIG.15 BASIC CIRCUIT DIAGRAM OF THE LOGARITHMIC AMPLIFIER Type Rel 3 D 920

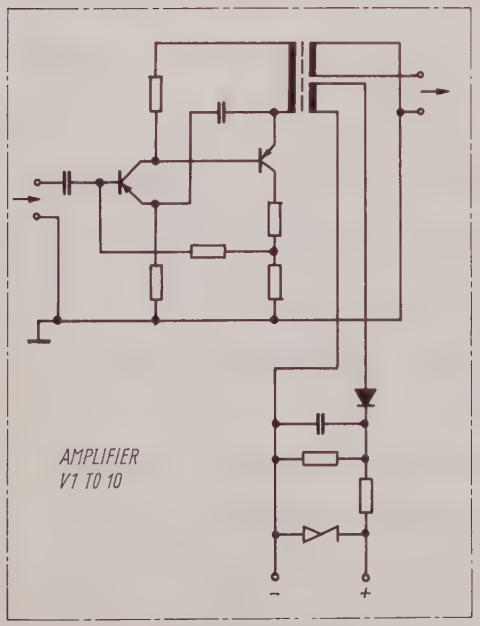


FIG.16 BASIC CIRCUIT DIAGRAM OF THE AMPLIFIER STAGES OF THE LOGARITHMIC AMPLIFIER

The two possible intermediate frequencies of 50 or 100 kc/s can be selected by switching the inductance of a resonant circuit between the 4th and 5th amplifiers with an easily accessible key in the slide-in chassis.

A voltage divider for the level reference line, reconnectable in 10-db steps, is also incorporated in this slide-in chassis.

E. Frequency Marker Slide-in Chassis Type Rel 3 D 928

The frequency markers result from the signals supplied by the transmitting section (see page 1.5). The low-pass signal is applied to a pushpull cathode stage with a phase inverter stage and passed on to the pushpull limiter circuit with the Zener diodes Gr11 to Gr14 via the capacitors C35, C36 (see Fig.17). The subsequent rectifier circuit Gr15/Gr16 only passes the positive alternation (pushpull rectification) of the signal so that a pulse comes about. Via an amplifier in the level tracer this pulse reaches the cathode of the picture tube and there unblanks the electronic beam for one or several vertical deflection periods.

The magnitude of the pulses can be varied with control P5 and the brightness of the frequency lines can thus be adjusted.

In the case of a high-pass signal this signal - envelope curve with zero crossover - is displayed on the sreen. The zero crossover is the frequency measuring point and corresponds to the frequency f1+f2 set on the level oscillator. In the frequency marker slide-in chassis a DC voltage variable from -12.5 to +67 v is superimposed on the signal after it has passed a buffer stage (Fig.18). By changing this voltage (with P4) the envelope curve can be vertically shifted over the entire height of the screen so that sections of the measuring curve which are of interest are visible and the frequency measurement of trace points can be exactly carried out by establishing the intersection between the measuring curve and zero crossover. The further conversion of the signal into beam-gating pulses is effected in the basic unit (see page 1.10).

Two movable vertical lines which can be calibrated with the frequency marker or line are used for establishing a frequency pattern. The beam-gating pulses for these vertical marking lines come about in the frequency marker slide-in chassis (Fig.19) as follows: In a differential amplifier the triangular horizontal deflecting voltage is compared with a DC voltage.

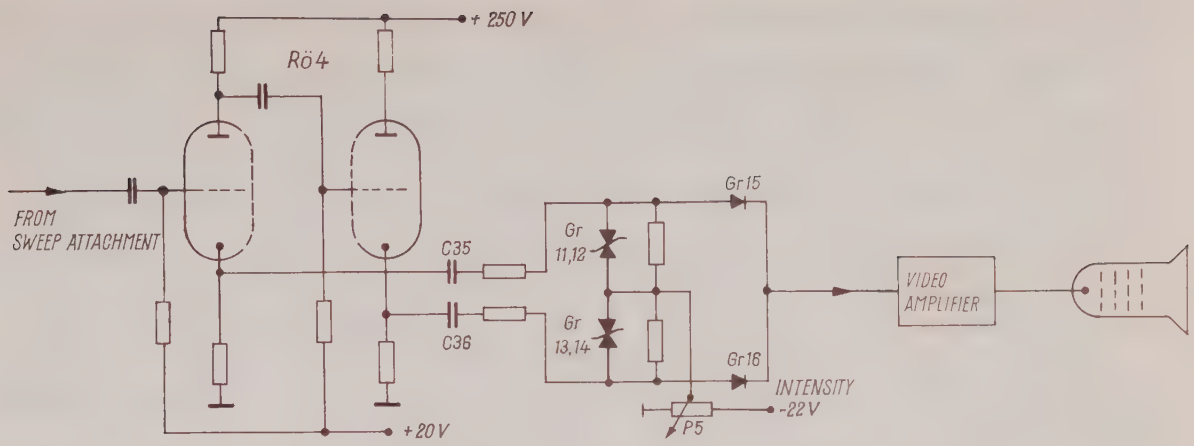


FIG. 17 BASIC CIRCUIT DIAGRAM FOR FREQUENCY LINES (LOW-PASS SIGNAL)

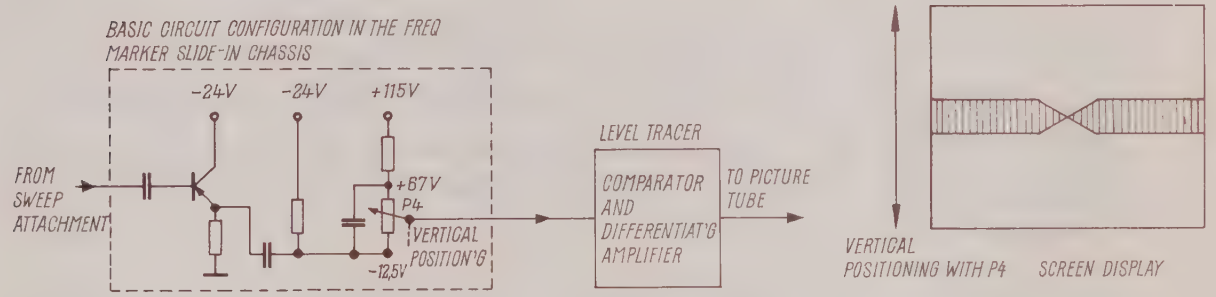


FIG. 18 FREQUENCY MARKER (HIGH-PASS SIGNAL) IN THE RECEIVING SECTION

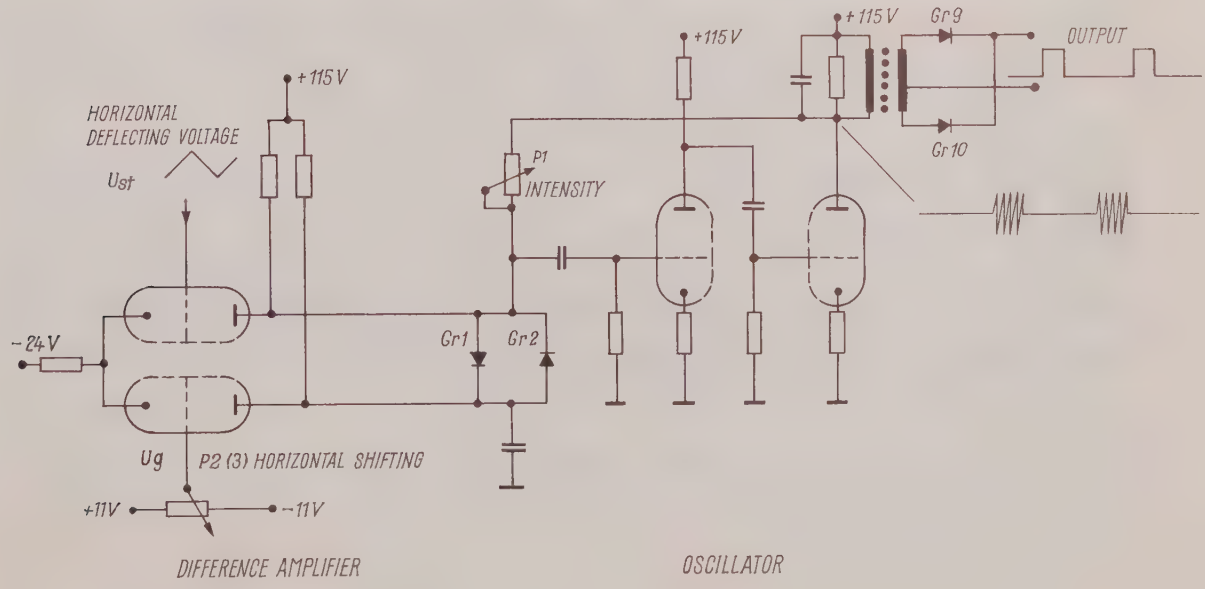


FIG. 19 BASIC CIRCUIT FOR THE MARKING LINES

If the instantaneous value of the control voltage E_{st} equals the DC voltage E_G, the voltage drop across the two anode resistors is also equal and the potential difference between the anodes is 0 v. Only at this instant is the resistance of the two diodes (Gr1, Gr2) high, which are connected in parallel between the anodes with opposite polarities. The diodes are part of the following RF oscillator. It can oscillate when the resistance of the two diodes is high ($E_{st} = E_g$) and the oscillation stops when the resistance of one of the two diodes becomes low ($E_{st} \neq E_g$). The oscillations of the oscillator are rectified (Gr9, Gr10); the resulting pulses are the beam-gating pulses for the marking line running in a vertical direction. A second differential amplifier, which is connected to the same oscillator, controls the pulses for the second marking line.

The voltage E_{st} is simultaneously used as sweep control voltage for the sweep oscillator and as voltage for the horizontal deflection of the picture tube. It is thus clear that, when the voltage E_g remains the same, the pulse derived from the voltage comparison unblanks a line at the same place of the screen, whose width is independent of the sweep range. By changing the voltage E_g (with P2/3) the time for the initiation of the pulse can be changed so that the marking line can be shifted over the entire width of the screen.

F. Attachments

1. Level Pattern Sender Type Rel 3 B 945

The level scale settable on the screen with the potentiometers P1 to P5 must be newly set for every measuring task. For often recurring measurements it is expedient to use the same calibrated level scales.

Plug-in level pattern senders (Type Rel 3 B 945), which contain eight comparators and can thus give rise to eight level lines, are available for this purpose. After opening the level pattern sender the position of the level lines for a specific measuring task can be set on the comparator potentiometers with a screwdriver. By exchanging the senders the scale for the respective task is reestablished at once.

Apart from saving time, a higher measuring accuracy is reached as faults due to inadvertent resetting of the potentiometers or due to erroneous calibration are avoided.

2. Alternate-Presentation Switch Type Rel 3 B 946

The sensitivity of the level tracer can be increased by the adjustable expansion so that level differences of 0.01 db are still recognizable. A possibility to utilize this high sensitivity within large frequency ranges is provided by the comparison method (alternate-presentation method). In this method the standard N and the specimen X are reconnected at the sweeping rate by the switch Type Rel 3 B 946 so that during the forward and return sweeps the curves of N and X are alternately displayed on the screen.

As this measuring method is a pure comparison measurement the residual level distortions, for instance the frequency responses of the individual measuring instruments employed, as well as the faults of the supply lines in case of the same layout, must not be taken into account and the smallest attenuation differences between the speciment under test and standard can be measured.

In series tests the comparison method offers great advantages as time-consuming measurements and readings are no longer required during alignment of the specimen under test. One must only see to it that the two curves coincide. Due to its small dimensions the alternate-presentation switch can be easily added to the measuring setup without requiring long supply lines. Its reflection coefficient is so low that no additional measuring error comes about. For details refer to the Full Information on the Alternate Presentation Switch Rel gesamt 3 B 946...

3. Reflection Coefficient Measurements

All measurements which can be reduced to voltage measurements can be carried out with the level tracer. In measuring practice the reflection coefficient must often be determined. Reflection coefficient measuring bridges are available for this purpose; they are partly contained in the level meters of the sweep measuring setups or can be supplied as accessories, for instance for the frequency range of 30 kc/s to 15 mc/s the reflectometer bridge Type Rel 3 R 132 with which a reflection coefficient of a few tenths of a percent can be measured (see the Full Information Rel gesamt 3 R 132).

IV. TYPES, DIMENSIONS, AND WEIGHTS

Description	Type	Dimensions	Approx. Weight in kg
Level Tracer (basic unit)	Rel 3 D 346b1a	556x394x517	35
Accessories			
20 tubes	CCa	-	-
1 tube	E 236 L	-	-
1 tube	PY 81	-	-
1 tube	EY 86	-	-
1 stabilizer tube	85 A 2	-	-
1 picture tube	10 WP 19 A (Fa. Dumont)	-	-
Required for Operation			
1 frequency marker slide-in chassis	Rel 3 D 928a1a	111x165x235	1
1 wideband amplifier slide-in chassis 10 kc/s to 15 mc/s			
model -4.5 to -1.0 N	Rel 3 D 917b1a	111x165x235	1.5
model -40 to -5.0 db	Rel 3 D 917b2a	111x165x235	1.5
model -30 to +5.0 dbm	Rel 3 D 917b3a	111x165x235	1.5
or			
1 wideband amplifier slide-in chassis 200 c/s to 1.6 mc/s			
model -7 to +1 N	Rel 3 D 918a1a	111x165x235	1
model -60 to +10 db	Rel 3 D 918a2a	111x165x235	1
or			
1 wideband amplifier slide-in chassis 30 c/s to 30 (100) kc/s			
model -4.5 to +2 N	Rel 3 D 919a1a	111x165x235	1
model -40 to +20 db	Rel 3 D 919a2a	111x165x235	1
or			
1 IF amplifier slide-in chassis 1 to 5 kc/s			
neper model	Rel 3 D 916b1a	111x165x235	1
decibel model	Rel 3 D 916b2a	111x165x235	1

Description	Type	Dimensions in mm	Approx. Weight in kg
or			
1 logarithmic IF amplifier slide-in chassis			
neper model	Rel 3 D 920a1a	111x165x235	1
decibel model	Rel 3 D 920a2a	111x165x235	1
Optionally for the Level Tracer			
Level pattern sender	Rel 3 B 945	50x110x45	0.5
1 alternate-presentation switch	Rel 3 B 946	150x98x168	1
1 test probe 10 kc/s to 17 mc/s	Rel 3 B 938	170x27 dia.	0.5

I. PREPARATION

The device leaves the factory adjusted for connection to AC mains of 220 v. For connection to other AC mains the chassis has to be taken out of the casing and the voltage selector switch S4 at the right side of the device in the power supply unit, which is then accessible, has to be turned to the available mains voltage. For mains voltages of 110 or 130 v insert a fuse link of 4 amp into the fuse element on the front panel.

Corresponding to the safety code of the Verein Deutscher Elektrotechniker (VDE) mains-powered appliances, whose touch potential can exceed 65 v with respect to ground in the case of a fault, must be provided with a protective conductor terminal.

The devices are therefore equipped with a power cord with protective conductor and safety plug (Schuko plug) for insertion into a three-wire power outlet with protective ground (Schuko outlet). Both the plugging connection and the cross section of the non-current carrying protective conductor must be equivalent to those of the current-carrying conductors.

When the Schuko plug has to be replaced with some other (locally customary) plug with protective contact, connect the three wires (red, grey, and black) of the power cord as follows:

in non-polarized connector systems
- red wire to the protective conductor terminal
- grey and black wire to the current-carrying terminals

in polarized connector systems in mains with phase wire and neutral
- red wire to the protective conductor terminal
- grey wire to the neutral terminal
- black wire to the "phase" terminal.

The device furthermore has an extra terminal (⏚) on the front panel which is connected to chassis ground.

Before connecting the level tracer to the mains, insert the measuring slide-in chassis suited for the measuring task (see Electrical Data).

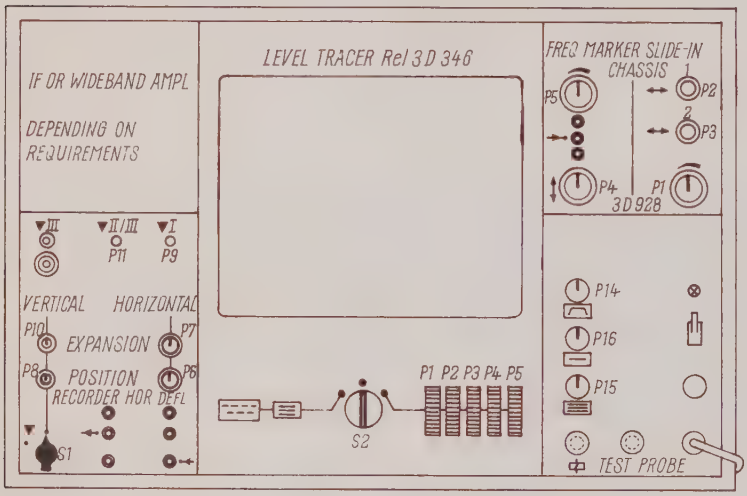


FIG.1 LEVEL TRACER
CONTROL ELEMENTS

II. OPERATION OF THE BASIC UNIT

A. Setting of the Control (Fig.1)

1. Brightness Control (right side of the basic unit, Fig.2)

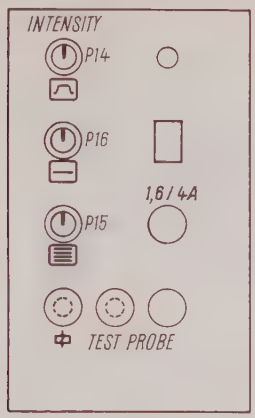


FIG.2 BASIC UNIT, RIGHT SIDE

Independently of each other the following can be set

the brightness of the measuring curve	with P14
the brightness of the level reference line	with P16
the brightness of the level lines	with P15

The measuring curve is the line determined by the input voltage (the level to be measured).

The level reference line is a line derived from a stabilized voltage which can be reset in well-defined db or N steps. It is used for calibrating the amplifier for the measuring curve and for calibrating the level lines.

The level lines are five horizontal lines which can be shifted with the controls P1 to P5 over the entire height of the screen. A scale can be established with these lines. Instead of the five movable lines up to eight level lines can be established with a plug-in level pattern sender.

2. Control for the Horizontal and Vertical Position and Expansion (left side of the basic unit, Fig.3)

FIG.3 BASIC UNIT, LEFT SIDE

The frequency resolution is determined by the sweep range, i.e. the frequency deviation set at the respective sweep oscillator is displayed over the entire width of the screen. A HORIZONTAL EXPANSION can be additionally set with the control P7 and the frequency range of interest can be moved into position on the screen by means of control P6 POSITION.

Deviating from the calibration determined by the level reference line, the indicating sensitivity can be increased with the control P10 VERTICAL EXPANSION so that about 1.5 cm of the screen height correspond to a level difference of 0.1 db. If measuring is effected with expansion, turn switch S1 from position "▼" to position VERTICAL.

First of all bring the measuring curve into the lower part of the screen with P8 POSITION VERTICAL as the measuring curve is shifted upward when the expansion is set with P10; it is then possible to observe the desired expansion.

B. Calibrating

The bay can be calibrated approximately 15 minutes after energization. During this preparation time turn the brightness controls P14, P15, P16 counterclockwise (dark) or apply the deflecting voltage from the sweep attachment to the jack HORIZONTAL DEFLECTION so that burning-in of the luminous spot is avoided on the screen.

1. Calibrating I (-∞line)

A measuring amplifier slide-in chassis must be inserted in the level tracer; no signal must be applied to its input.

Turn switch S2 LEVEL LINES in the basic unit to OFF (center position).

Turn the brightness controls for the measuring curve (P14) and the level lines (P15) to the right until two luminous spots or - when the deflecting voltage is connected - two horizontal lines become visible.

Turn switch S1 to position ▼ CALIBRATING.

With P9 "▼I" make both spots or lines coincide.

If calibrating is to be effected during the measurement, disconnect the voltage to be measured from the measuring amplifier slide-in chassis. The level line - ∞ is displayed in all positions of switch S2.

2. Calibration for Wideband Measurements (▼II, ▼III)

This is only required when the absolute level is to be measured in wideband reception. Insert the respective wideband amplifier into the level tracer. The calibrating voltage is available at the jacks "▼II" (0 db) and "▼III" (-40 db). Connect the input of the wideband amplifier Type Rel 3 D 917 to jack "▼II", the input of the wideband amplifier Type Rel 3 D 918 or Rel 3 D 919 to jack "▼III". Leave the parallel jacks at the input of the amplifier Type Rel 3 D 918 or 3 D 919 unassigned. Bring the switches of the respective slide-in chassis to the calibrating position "▼II" or "▼III".

Disconnect the level lines (switch S2 in the basic unit) (center position). Set the brightness controls for the measuring curve and the level reference line (P14/16) so that two spots or - when the deflecting voltage is connected - two lines become visible in the upper third of the screen. Then make both spots or lines coincide, using the calibrating control P11 "▼II, ▼III".

3. Calibration for Selective Measurements

In the selective mode the calibration for measuring the absolute level is effected in conjunction with the level meter. Use the calibrating voltage of the level meter and set the measuring curve to the 0-db (0-N) reference line.

4. Calibration of the Level Lines

The controls P1 to P5 for the vertical shifting of the five level lines are arranged below the picture tube. Selection from among these level lines and the level lines controlled by the plug-in level pattern sender, or disconnection of the level lines, is possible with switch S2.

Without level expansion. For calibrating a level scale, set the level reference line (setting at the respective measuring slide-in chassis) subsequently to the values to be calibrated and make one of the level lines coincide with it. The calibration of the level lines of a level pattern sender can be effected in the same way. Unscrew the protective cap of the level pattern sender and effect the setting with the potentiometers which are then accessible.

With level expansion. For establishing a level scale or for setting the tolerance lines during measurement with level expansion, calibrate the level lines with the measuring curve. To this end connect a suitable attenuator between the oscillator and the specimen under test and set the desired level steps with the attenuator. After setting is completed, the attenuator can be removed. If the expansion is changed, the level lines must be recalibrated.

Move level lines that are not required upwards off the screen so that they are no longer displayed.

III. OPERATION OF THE SLIDE-IN CHASSIS

A. Frequency Marker Slide-in Chassis Type Rel 3 D 928 (Fig.4)

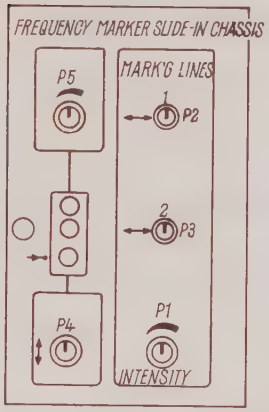


FIG.4 FREQUENCY MARKER SLIDE-IN CHASSIS

Feed the frequency marker signals from the transmitting section into the input jack of the frequency marker slide-in chassis. Set the frequency and select the form of the frequency markers (high-pass, low-pass signal in dependence on the sweep range) in the transmitting section (see description of the transmitting section).

The brightness of the frequency marker can be set with P5 and the vertical position of the frequency calibrating mark with P4. The horizontal position of the two vertical marking lines can be determined with P2 and P3 and their brightness regulated with P1.

Calibrating the Marking Lines. Set the frequency marker at the transmitting section to the frequency to be marked and by means of P2 or P3 make a marking line coincide with the frequency marker. Do the same thing at a second frequency and then use the frequency marker as third marking point.

When the center frequency or the sweep range is changed, the marking lines must be newly calibrated.

B. IF Amplifier Slide-in Chassis Type Rel 3 D 916, 1 to 5 kc/s (Fig.5)

FIG.5 IF AMPLIFIER

This measuring amplifier slide-in chassis is provided for connection to the level meters Type Rel 3 D 355 and Type Rel 3 D 344.

The input sensitivity can be reconnected for adaptation to the different output voltages of these two level meters. For measurements with the level meter Type Rel 3 D 344 turn switch S4 to PREAMPLIFIER ON, with the level meter Type Rel 3 D 335 turn it to OFF.

The input sensitivity can furthermore be reduced in three 1-db (0.1-N) steps with the attenuation switch S1, for instance for the calibration for absolute level measurements.

For finding the measuring result, add the value set on the band switch of the level meter to the value read on the level tracer.

The level reference line can be coarsely set in 1-db (0.1-N) steps with switch S2 and finely in 0.1-db (0.01-N) steps with switch S3.

C. Wideband Amplifier Slide-in Chassis Type Rel 3 D 917, 10 kc/s to 15 mc/s (Fig.6)

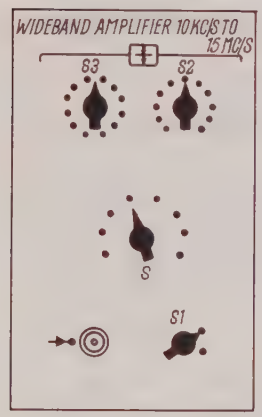


FIG.6 WIDEBAND AMPLIFIER

For wideband measurements with the 15-mc/s sweep measuring setup Type Rel 32 M 701 insert this measuring slide-in chassis.

The coaxial input of this slide-in chassis is always terminated into 75 Ω. Select the input sensitivity between -5 and -40 db with switch S4 (in 5-db steps). For calibrating the level lines or for reading the measuring curve directly, the level reference line can be shifted between -10.5 db (-1.05 N) and +1.5 db (+0.15 N) in 1-db (0.1-N) steps and 0.1-db (0.01-N) steps in this slide-in chassis.

Set the time constant of the rectifier circuit with S1 corresponding to the lowest measuring frequency.

D. Wideband Amplifier Slide-in Chassis Type Rel 3 D 918, 200 c/s to 1.6 mc/s

Use the slide-in chassis Type Rel 3 D 918 for wideband measurements in the carrier range up to 1.6 mc/s. The impedance of its coaxial input is high; if required, connect the termination for the specimen under test to the parallel jack. Adapt the sensitivity (between -60 and +10 db in steps of 5 db each) to the level to be measured by means of the level range switch.

Set switch "fu" so that the lowest measuring frequency is within the set range (0.2 to 2 kc/s, 2 to 10 kc/s, or above 10 kc/s).

Establish the scale or read the measuring curve with the aid of the level reference line, adjustable between +1.5 and -10.5 db.

Balanced measurements can be effected by connecting the level meter Type Rel 3 D 344 or 354 ahead of the device (mode of operation WIDEBAND). For the interworking with the selective level meters Type D 344 and D 354 this slide-in chassis can be left in the device.

E. Wideband Amplifier Slide-in Chassis Type Rel 3 D 919, 30 c/s to 30 kc/s

This slide-in chassis is used for wideband measurements with the audio sweep measuring setup Type Rel 33 M 703 with or without a preceding level meter Type Rel 3 D 342.

Apply the level to be measured to the unbalanced high-impedance input and connect to the parallel jack a termination corresponding to the specimen under test. For balanced measurements use a plug-in balancing transformer.

By means of the level range switch adjustable between +20 and -40 db (+2 and -4.5 N) in 5-db (0.5-N) steps adapt the input sensitivity to the level supplied.

By means of switch "fu" set the time constant to the lowest frequency to be measured.

Effect the measurement or setting of a level scale with the level reference line (switch LEVEL REFERENCE can be set from +1.5 to -10.5 db (+0.15 to -1.05 N)).

F. Logarithmic IF Amplifier 50/100 kc/s Type Rel 3 D 920 (Fig.7)

FIG.7 LOGARITHMIC IF AMPLIFIER

The logarithmic IF amplifier is suited for the logarithmic indication of measuring curves with level differences of up to 100 db (10 N). It can be connected to a level meter with a 50-kc/s or 100-kc/s IF output (e.g. Type Rel 3 D 354).

Corresponding to the level meter set the intermediate frequency to 50 or 100 kc/s before inserting the device.

Feed the intermediate-frequency signal of the level meter into the input jacks.

Establish the level scale with the level reference line.

Set the time constant on switch "τ" so that the measuring curve coincides in the forward and return sweep. Note that the transient buildup of the specimen under test can also be recognized by the divergence of the measuring curve in the forward and return sweep; by reducing the sweep rate this can, however, be corrected.

G. Connection of the Attachments

1. Alternate-Presentation Switch Type Rel 3 B 946

For measurements with the alternate-presentation switch, observe the Instructions for Use contained in its Full Information Rel gesamt 3 B 946. The operating voltages and the synchronizing voltage for the switch must be taken from the jack " " at the right side of the level tracer.

2. Test Probe

The test probes, for instance Type Rel 3 B 938 or Type Rel 3 B 939, can be fed from the jack TEST PROBE (at the right side of the level tracer). Connect the coaxial output of the test probe to the input jack of the corresponding measuring slide-in chassis.

3. Picture Tube Camera Type Rel 3 B 952

For photographing the screen displays the picture tube camera Type Rel 3 B 952 is available for the level tracer, and, with exchangeable tubes, also for other display devices and oscilloscopes. It operates according to the POLAROID principle and supplies a complete photograph within 10 sec. For details see the Full Information Rel 3 B 952.

4. Recorder

Apart from the picture tube camera a recorder can also be connected for recording the display. The jack RECORDER at the left side of the level tracer is provided for this purpose. Voltage for full deflection on the level tracer: 40 v with an internal resistance of 100 kΩ.

S T Ü C K L I S T E

Vorbemerkung

Unter Symbol stehen die in den Stromläufen verwendeten Abkürzungen für die Bauteile in alphabetischer und - soweit möglich - in numerischer Reihenfolge. Mit Stück ist die Anzahl der gleichen Bauteile innerhalb der Geräte oder der Baugruppe bezeichnet. In der Spalte Gegenstand sind außer dem Namen des Bauteils auch seine Hauptkennwerte angegeben. Mit der Bestellangabe ist das Bauteil durch einen Abkürzungs-Code oder eine Bauvorschrift eindeutig gekennzeichnet.

Es bedeuten:

bei einem Widerstand:	300 kΩ ±5%; 0,5 W
300 kΩ	Nennwert des Widerstandes
±5%	Toleranz des Nennwiderstandes
0,5 W	Belastbarkeit bezogen auf Umgebungstemperatur 20°C
bei einem Kondensator:	1000 pF ±20%; 125 V-
1000 pF.	Nennwert der Kapazität (1 pF = 1 µµF = 10^{-12} F)
±20%	Toleranz der Nennkapazität
125 V-	zulässige Betriebsgleichspannung

bei einem Übertrager:	Wicklg.I (1a,2a,3a)	Wicklg.II (rtsw,gesw, rtgn,gegnsw)+
	440 Wdg 0,1 CuL 75 Ω	720 Wdg HFL SS 60x0,03 35 Ω
	228 µH ±2%	1.Abgriff (gesw): 46 Wdg
	Abgriff(2a):210 Wdg	2.Abgriff (rtgn): 190 Wdg

Wicklg.I (1a,2a,3a)	
440 Wdg	440 Windungen, Anfang Lötöse 1a, Ende 3a;
0,1 CuL	aus Kupferdraht (Cu); 0,1 mm Ø; lackisoliert (L)
75 Ω	Gleichstromwiderstand der Wicklung I
228 µH	Induktivität
Abgriff(2a): 210 Wdg .	Abgriff bei der 210.Windung, Lötöse 2a
Wicklg.II	sinngemäß wie bei Wicklung I
HFL SS 60x0,03	Hochfrequenzlitze 2fach seidenumsponnen (SS), aus Kupferdraht 60x0,03 mm Ø

bei einem Gleichrichter:	50 V/250 mA
50 V	Anschluß-Wechselspannung
250 mA	entnehmbarer Betriebsstrom

bei Halbleitern:		
J_D	Durchlaßstrom bei +1 V	Dioden
U_{Sp}	Sperrspannung	Dioden
J_Z	Zenerstrom	Zenerdioden
U_Z	Zenerspannung	Zenerdioden
r_Z	Dynamischer Zener-Widerstand bei J_Z	Zenerdioden
R_{20}	Widerstand bei 20°C z.B. von Heißleitern	
TK	Temperaturkoeffizient	

+ Farb-Kurzzeichen

bl = blau	ge = gelb	gr = grau	sw = schwarz	rs = rosa
br = braun	gn = grün	rt = rot	ws = weiß	rtsw = rot/schwarz

PARTS LIST

Introductory remark

The "SYMBOL" column shows the abbreviations used in the circuit diagrams in alphabetic and, to the extent possible, numerical order. "QTY" denotes the number of identical components within the devices or the subassembly. The "DESCRIPTION" column gives, apart from the designation of the components, its principal characteristic data. The "ORDERING DATA" column designates the component nonambiguously by an abbreviation code or a component specification.

There denotes, for instance

with a resistor:	300 kΩ ±5%; 0,5 W
300 kΩ	Nominal value of the resistance
±5%	Tolerance of the nominal resistance
0,5 W	Wattage rating, as referred to an ambient temperature of 20°C
with a capacitor:	1000 pF ±20%; 125 V-
1000 pF	Nominal value of the capacitance (1 pF = 1 µµF = 10^{-12} F)
±20%	Tolerance of the nominal capacitance
125 V-	Permissible DC operating voltage

with a transformer:

Wicklg. I(1a,2a,3a)	Wicklg. II(rtsw,gesw, rtgn,gegnsw)+
440 Wdg 0,1 CuL 75 Ω	720 Wdg HFL SS 60x0,03 35 Ω
228 µH ±2%	1.Abgriff(gesw): 46 Wdg
Abgriff(2a): 210 Wdg	2.Abgriff(rtgn): 190 Wdg

Wicklg.I(1a,2a,3a)	
440 Wdg	440 turns, start soldering lug 1a, end 3a
0,1 CuL	of copper wire (Cu); 0.1 mm dia., enamelled (L)
75 Ω	DC resistance of winding I
228 µH	Inductance
Abgriff(2a):210Wdg	Tap at soldering lug 2a at the 210th turn
Wicklg. II . . .	Analogously to winding I
HFL SS 60x0,03 .	RF copper Litz wire, with double silk covering, 60x0.03 mm dia.
with a rectifier:	50 V/250 mA
50 V	Primary AC voltage
250 mA	Available operating current

with semiconductors:

J_D	Forward current with +1 v	Diodes
U_{Sp}	Inverse voltage	
J_Z	Zener current	Zener diodes
U_Z	Zener voltage	
r_Z	Dynamic Zener resistance at J_Z	
R_{20}	Resistance at 20°C, e.g., of thermistors	
TK	Temperature coefficient	

+Color symbols

bl = blue	ge = yellow	gr = gray	sw = black	rs = pink
br = brown	gn = green	rt = red	ws = white	rtsw = red/black

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA	Seite PAGE
	1	Hochspannungsteil HIGH-VOLTAGE SECTION	Rel 35 D 433b1a	4.4
	1	Gleichspannungsverstärker DC-AMPLIFIER	Rel 35 D 434b1a	4.7
	1	Differenzierverstärker DIFFERENTIATING AMPLIFIER	Rel 35 D 435b1a	4.10
	1	Sägezahn- und Horizontal-verstärker SAWTOOTH AND HORIZONTAL AMPLIFIER POWER SUPPLY UNIT	Rel 35 D 436b1a	4.15
	1	Netzteil POWER SUPPLY UNIT	Rel 35 D 437b1a	4.20
	nach Bedarf zu beordernde Einschübe SLIDE-IN CHASSIS TO BE ORDERED ACCORDING TO REQUIREMENTS			
		Breitbandverstärker WIDEBAND AMPLIFIER		
	1	Np	Rel 3 D 917b1a	4.25
	1	dB	Rel 3 D 917b2a	4.25
		ZF-Verstärker IF AMPLIFIER		
	1	Np	Rel 3 D 916b1a	4.35
	1	dB	Rel 3 D 916b2a	4.35
	1	Frequenzmarken-Einschub FREQUENCY MARKER SLIDE-IN CHASSIS	Rel 3 D 928a1a	4.44
	3	Signallampe INDICATING LAMP	Fg lp 62b
Si 2	3	G-Schmelzeinsatz G-FUSE LINK	D41571-M1600-E2 M 1,6 E DIN 41571 (2 als Ersatz)
	1	Netzanschlußleitung POWER CORD	Rel ltg 702e
	nach Bedarf zu beorderndes Zubehör ACCESSORIES TO BE ORDERED ACCORDING TO REQUIREMENTS		
E 71	1	Rastgeber LEVEL PATTERN SENDER	Rel Sk 3 B 945a1a
E 72	1	Prüfkabel TEST CORD	Rel Bv 657 C 3006

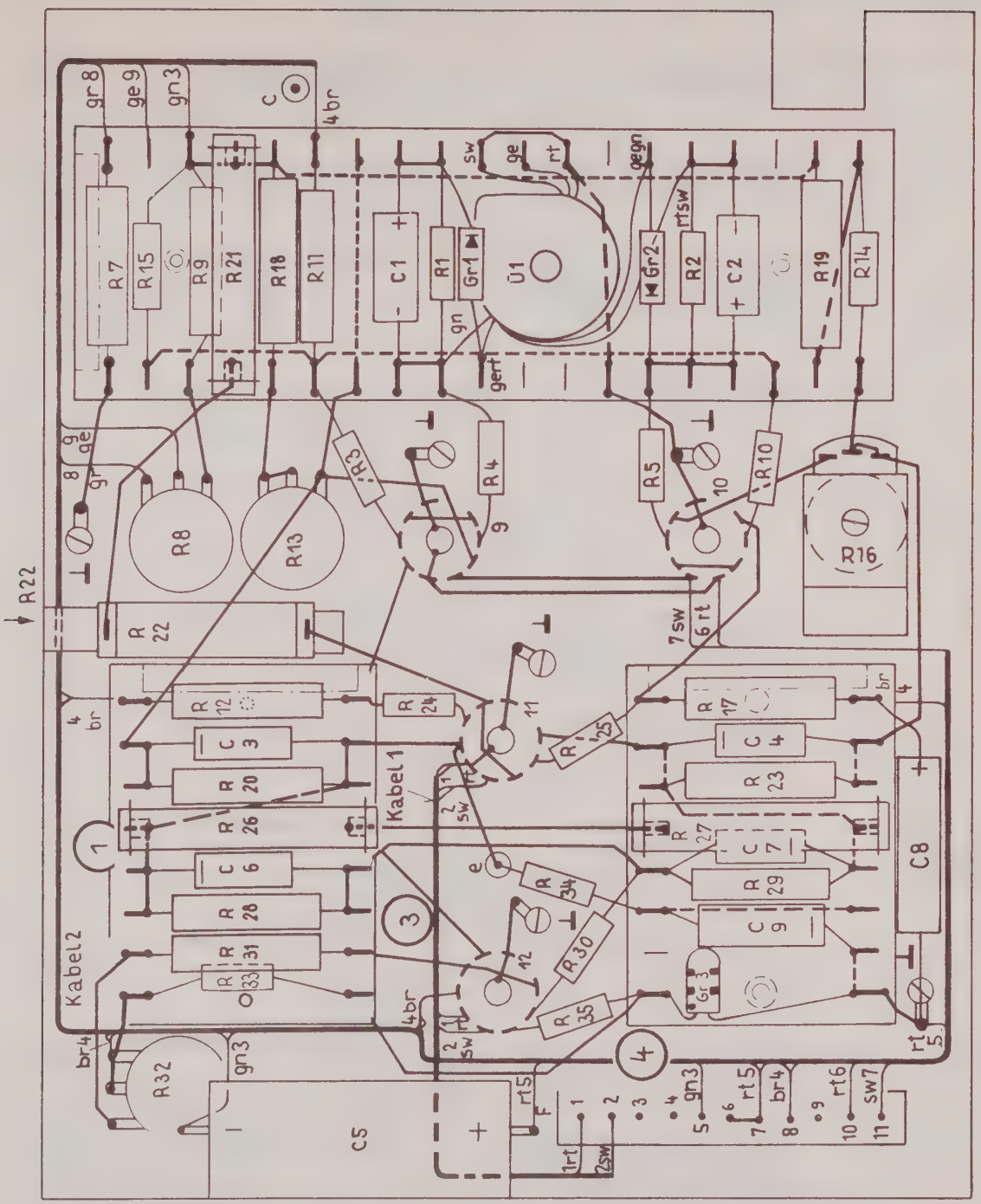
Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA
		Styroflex-Kondensator STYROFLEX CAPACITOR	
C 1	1	70pF ±5%; 500V	B31141-A5700-J
C 2	1	6000pF ±5%; 250V	B31143-A2602-J
C 3,4 26	3	MKH-Kondensator MKH CAPACITOR 0,022µF ±20%; 300V	B32220-A3223-M
		Styroflex-Kondensator STYROFLEX CAPACITOR	
C 5	1	300pF ±20%; 500V	B31141-A5301-M
C 6	1	5000pF ±20%; 125V	B31142-A1502-M
C 7	1	MKH-Kondensator MKH CAPACITOR 0,047µF ±20%; 400V	B32220-A6473-M
C 8	1	0,01µF ±20%; 400V	B32220-A6103-M
C 9	1	MKL-Kondensator MKL CAPACITOR 0,22µF ±20%; 160V	B32110-C1224-M
C 10	1	FKH-Kondensator FKH CAPACITOR 0,015µF ±20%; 400V	B 32210 A 0,015 M 400
C 11	1	MKL-Kondensator MKL CAPACITOR 1µF ±20%; 250V	B32110-C2105-M
		MKH-Kondensator MKH CAPACITOR	
C 12,13,15,16, 18,22	6	0,1µF ±20%; 600V	B32220-A6104-M
C 14,19	2	0,05µF ±20%; 1kV	B32227-A0503-M
C 17	1	FKH-Kondensator FKH CAPACITOR 0,02µF ±20%; 400V	B32210 A 0,02 M 400
		Styroflex-Kondensator STYROFLEX CAPACITOR	
C 20	1	100pF ±5%; 500V	B31141-A5101-J
C 21	1	50pF ±5%; 500V	B31141-A5500-J
C 23	1	33pF ±10%; 500V	B31140-A5330-K
C 25	1	2920pF ±2%; 250V	B31142-A2292-G200

		Diode CRYSTAL DIODE	
Gr 1	1	J_D=100mA bei/AT 0,85V U_{Sp}=80V	OA 182 (Fa.Telefunken)
Gr 5,6	2	J_D=175mA; U_{Sp}=300V	BAY 30
Gr 3,4	2	Flachsgleichrichter FLAT-TYPE RECTIFIER 250V / 40mA	V23201-F1075
L 1	1	Spule (9 Rel sp 6e) COIL Wicklg. I (1,4) 174 Wdg 0,26 CuL 3,1Ω 10,1 bis 11,1mH	Rel Bv 622 P 3263
L 2,3	2	Drossel CHOKE	B 82501-D-A24
L 4	1	Spule (Rel sp 82) COIL Wicklg. I (rt,ge) 206,5 Wdg 0,14 CuL 7,7Ω 6,1 bis 6,7mH	Rel Bv 622 W 3013
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 1,8	2	6kΩ ±5%; 0,5W	B 51265 A 6 K 5/2
R 2,6	2	100kΩ ±5%; 0;25W	B 51263 A 100 K 5/2
R 3	1	10kΩ ±5%; 0,25W	B 51263 A 10 K 5/2
R 4 15	2	100Ω ±10%; 0,33W	B 51263 A 100 Ω 10/5
R 5	1	50kΩ ±10%; 0,33W	B 51263 A 50 K 10/5
R 7	1	50kΩ ±2%; 0,33W	B 51264 A 50 K 2/2
R 9	1	20kΩ ±10%; 0,33W	B 51263 A 20 K 10/5
R 10	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 10kΩ ±20/-30%; 0,1W	10 kΩ lin Rel wd 165a
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 11,13	2	2,5MΩ ±10%; 0,5W	B 51264 A 2,5 M 10/5
R 12	1	1,2MΩ ±10%; 0,33W	B 51263 A 1,2 M 10/5
R 14	1	80kΩ ±2%; 0,5W	B 51265 A 80 K 2/2
R 16	1	1Ω ±2%; 0,25W	SWD 0,25 1 Ω ±2% Kl. 2 (Fa. Rosenthal)
R 17	1	300kΩ ±10%; 0,33W	B 51263 A 300 K 10/5
R 18 25	2	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 1MΩ +20/-30%; 0,1W	1 MΩ lin Rel wd 165a

		Schichtwiderstand LAYER-TYPE RESISTOR	
R 19	1	500kΩ ±10%; 0,33W	B 51263 A 500 K 10/5
R 20	1	50kΩ ±5%; 0,33W	B 51264 A 50 K 5/2
R 21	1	100Ω ±10%; 0,5W	B 51264 A 100 Ω 10/2
R 22	1	600Ω ±10%; 0,75W	B 51265 A 600 Ω 10/5
R 23	1	200kΩ ±10%; 0,33W	B 51263 A 200 K 10/5
R 26	1	250kΩ ±10%; 0,33W	B 51263 A 250 K 10/5
R 27	1	1MΩ ±10%; 0,33W	B 51263 A 1 M 10/5
R 28	1	100kΩ ±5%; 0,25W	B 51263 A 100 K 5/2
R 29	1	220kΩ ±5%; 0,25W	B 51265 A 1 M 1/0,5
R 30,31	2	1MΩ ±1%; 0,25W	B 51265 A 1 M 1/0,5
R 32	1	8kΩ ±5%; 0,33W	B 51264 A 8 K 5/2
R 33,34	2	250kΩ ±1%; 0,15W	B 51264 A 250 K 1/0,5
R 35	1	21kΩ ±1%; 0,5W	B 51266 A 21 K 1/0,5
R 36	1	3kΩ ±1%; 0,1W	B 51263 A 3 K 1/0,5
R 37	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 5kΩ +20/-30%; 0,1W	5 kΩ lin Rel wd 165a
R 38	1	Schichtwiderstand LAYER-TYPE RESISTOR 1MΩ ±20%; 0,33W	B 51263 A 1 M 20/5
Ü 1	1	Zeilentransformator LINE TRANSFORMER	AT 917-0 (Fa. Lorenz)
Ü 2	1	Übertrager (Rel sp 74b) TRANSFORMER Wicklg. I (3,4) 600 Wdg 0,10 CuL 80Ω 1,6H Wicklg. II (get) (gert) 5 Wdg YV 0,5/0,9 0,06Ω Wicklg. III (gn,gn) 5 Wdg YV 0,5/0,9 0,06Ω	Rel Bv 622 S 3335
Ü 3	1	Übertrager (Rel sp 74b) TRANSFORMER Wicklg. I (2,3,4,5) 276 Wdg 2x0,2 CuL paral. 5,1Ω 1. Abgriff (3): 250 Wdg 2. Abgriff (4): 272 Wdg 24,4mH	Rel Bv 622 S 3361
	2	Anoden-Klips ANODE CLIPS	Code Nr. P5.192.01 (Fa. Philips)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA
C 1,2	2	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 5µF +50/-20%; 15/18V	B41951-A4505-S
C 3,4	2	Styroflex-Kondensator STYROFLEX CAPACITOR 10pF ±1pF; 500V	B31141-A5100-F
C 5	1	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 25µF +50/-10%; 350/385V	B43651-A4256-T
C 6,7	1	Styroflex-Kondensator STYROFLEX CAPACITOR 100pF ±20%; 500V	B31141-A5101-M
C 8	1	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 2µF +50/-10%; 350/385V	B43711-A4205-T
C 9	1	MKH-Kondensator MKH CAPACITOR 0,1µF ±20%; 300V	B32220-A3104-M
Gr 1,2	2	Richtleiter CRYSTAL DIODE J_D = 50mA; U_{Sp} = 100V	AAY 25
Gr 3	1	Zenerdiode ZENER DIODE J_Z=20mA; U_Z=5V; r_Z=30Ω	SZ 5 KSt
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 1,2	2	20kΩ ±20%; 0,33W	B 51263 A 20 K 20/5
R 3,4,5,10 24,25,30	7	5kΩ ±20%; 0,33W	
R 7	1	50kΩ ±1%; 0,5W	B 51266 A 50 K 1/0,5
R 8	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 5kΩ +20/-30%; 0,1W	5 kΩ lin Rel wd 165a
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 9	1	27kΩ ±1%; 0,25W	B 51265 A 27 K 1/0,5
R 11	1	766kΩ ±1%; 0,25W	B 51265 A 760 K 1/0,5
R 12 17	2	340kΩ ±1%; 0,5W	B 51266 A 340 K 1/0,5

R 13	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 1kΩ +20/-30%; 0,1W	1 kΩ lin Rel wd 165a
R 14	1	Schichtwiderstand LAYER-TYPE RESISTOR 500Ω ±5%; 0,25W	B 51263 A 500 Ω 5/2
R 15	1	255kΩ ±1%; 0,15W	B 51264 A 255 K 1/0,5
R 16	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 500Ω +20/-30%; 0,1W	500 Ω lin Rel wd 165a
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 18,19	2	30kΩ ±1%; 0,5W	B 51266 A 30 K 1/0,5
R 20,23	2	80kΩ ±1%; 0,5W	B 51266 A 80 K 1/0,5
R 21	1	25kΩ ±5%; 2W	25 kΩ 5% 2 DIN 41404 R
R 22	1	Drahtspindelwiderstand WIRE-WOUND SPINDLE RESISTOR 4kΩ ±40/-0%; 1,4W	B 58125 A 4 K 40
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 26,27	2	30kΩ ±5%; 2W	30 kΩ 5% 2 DIN 41404 R
R 28,29	2	1MΩ ±1%; 0,25W	B 51265 A 1 M 1/0,5
R 31	1	25kΩ ±5%; 0,5W	B 51265 A 25 K 5/2
R 32	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 200kΩ +20/-30%; 0,05W	200 kΩ log Rel wd 165a
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 33	1	500kΩ ±20%; 0,33W	B 51263 A 500 K 20/5
R 34	1	100kΩ ±5%; 0,25W	B 51263 A 100 K 5/2
R 35	1	220Ω ±5%; 0,25W	B 51263 A 220 Ω 5/2
Ü 1	1	Übertrager (9 Rel sp 6c) TRANSFORMER Wicklg. I (ge,rt) 24 Wdg 0,25 CuL 0,5Ω 1,15...1,78mH	Rel Bv 622 P 3269



Gleichspannverstärker Rel ms 35 D 434b 1a (Ausgabe III)
DC AMPLIFIER Rel ms 35 D 434b 1a (ISSUE III)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA	Seite PAGE
		Komparator-Baugruppe COMPARATOR SUBASSEMBLY	Rel Sk 35 D 549a1a	4.13
C 20,70	2	Styroflex-Kondensator STYROFLEX CAPACITOR 30pF ±1pF; 125V	B31140-A1300-A	
		MKH-Kondensator MKH CAPACITOR		
C 21,35 44,71	4	0,1µF ±20%; 300V	B32220-3104-M	
C 23,27,31 46,49,52,53 55,59,73,77 81	12	0,01µF ±20%; 300V	B32220-A3103-M	
C 24 74	2	Styroflex-Kondensator STYROFLEX CAPACITOR 2500pF ±20%; 125V	B31142-A1252-M	
C 25 65 75	3	MKL-Kondensator MKL CAPACITOR 0,1µF ±20%; 100V	B32110-C0104-M	
C 26,30,33 48,51,54,58 61,76,80,83 56	12	MKH-Kondensator MKH CAPACITOR 0,022µF ±20%; 300V	B32220-A3223-M	
C 28,29,32 34,57,60,78 79,82	9	0,047µF ±20%; 300V	B32220-A3473-M	
C 36,37,38 62,63,64 85,86	8	Keramik-Duko CERAMIC LOAD-THROUGH CAP'R 5000pF / 500V	B37480-A5502-R000	
C 47,48	2	Styroflex-Kondensator STYROFLEX CAPACITOR 100pF ±20%; 125V	B31140-A1101-M	
C 50	1	500pF ±20%; 125V	B31140-A1501-M	
C 95,98	2	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 500µF +50/-20%; 70/80V	B41711-B8507-S	
C 96 101	2	MKL-Kondensator MKL CAPACITOR 0,15µF ±20%; 63V	B32110-D9154-M	

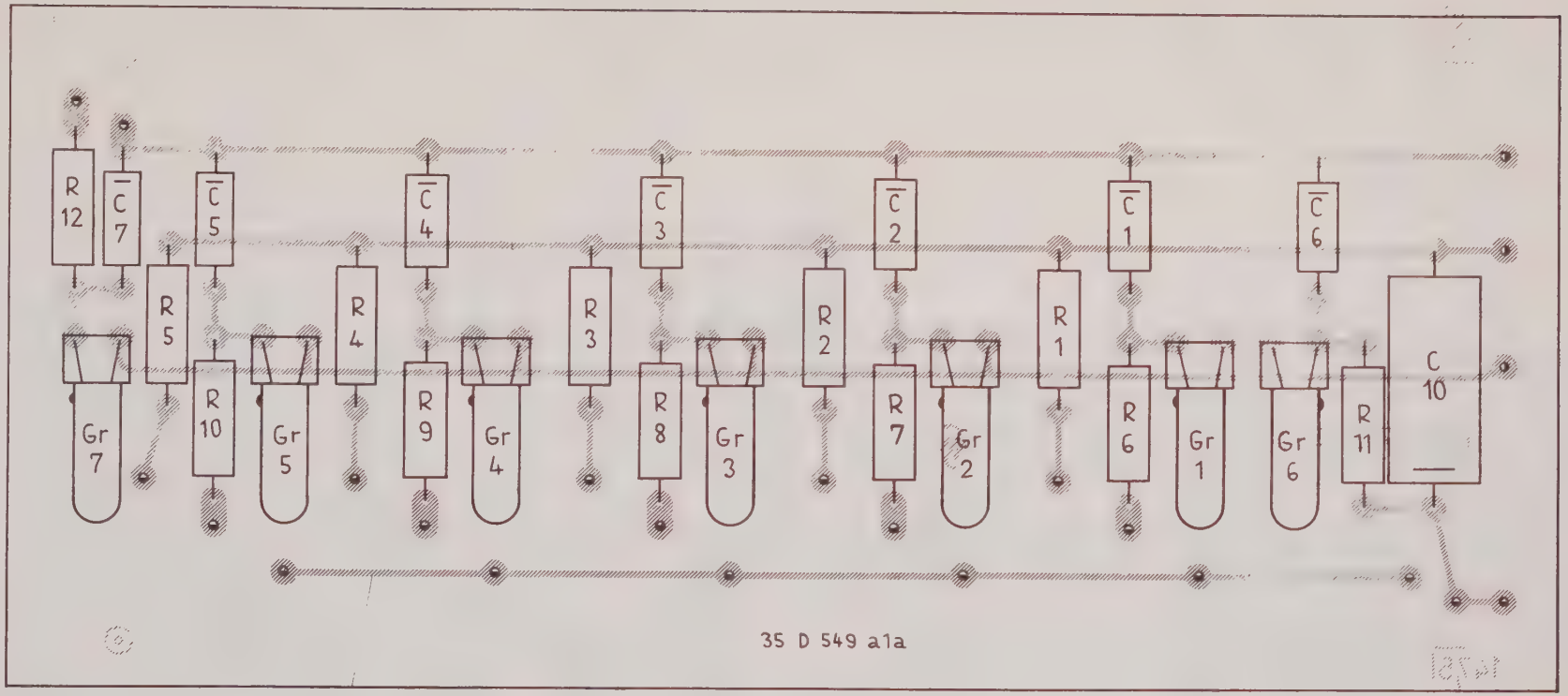
C 99 100	2	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 250µF +50/-20%; 35/40V	B41711-A7257-S
C 102	1	MKH-Kondensator MKH CAPACITOR 0,01µF ±20%; 250V	B32220-J3103-M
Gr 15 32	2	Richtleiter CRYSTAL DIODE J_D=200mA; U_{Sp}=100V	OA 5 (fa. Valvo)
Gr 16,17,19 20,25,27,28 33,35	9	J_D=100mA bei/AT 0,85V; U_{Sp}=80V	OA 182 (Fa.Telefunken)
Gr 18 26 34	3	J_D=50mA; U_{Sp}=100V	AAY 25
Gr 40,42	2	Flachgleichrichter FLAT-TYPE RECTIFIER 60V / 300mA	V23201-F1175
Gr 41,43	2	Zenerdiode ZENER DIODE J_Z=5mA; U_Z=8,2V; r_Z=7Ω	SZ 8 KB
Le 1	1	HF-Leitung HF LEAD 120Ω / 365mm/MM	Rel Bv 657 A 268 d 100
P1..P5	5	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 100kΩ +20/-30%; 0,1W	100 kΩ lin Rel wd 165b
R 29,30	2	Schichtwiderstand LAYER-TYPE RESISTOR 20kΩ ±10%; 0,33W	B51263 A 20 K 10/5
R 31	1	5kΩ ±10%; 0,33W	B 51263 A 5 K 10/5
R 32,35,37,40,42 45,47,71,75,77 80,82,85,87,90 91,94,95,111,115 116,122,123,126 127,135,136	27	100kΩ ±20%; 0,33W	B 51263 A 100 Ω 20/5
R 33,34,38,39,72 74,78,79,83,84 88,89,112,113, 114,120,121	17	2kΩ ±10%; 0,33W	B 51263 A 2 K 10/5
R 36,41,46,76,81 86,92,96,117 124,128	11	100kΩ ±5%; 0,25W	B 51263 A 100 K 5/2

R 43 101,131,147 162	5	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 100kΩ +20/-30%; 0,1W	100 kΩ lin Rel wd 165a
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 44 125	2	3kΩ ±10%; 0,33W	B 51263 A 3 K 10/5
R 48 97,129	3	600Ω ±10%; 0,33W	B 51263 A 600 Ω 10/5
R 49 100,132	3	80Ω ±10%; 0,33W	B 51263 A 80 Ω 10/5
R 50 99, 130	3	130kΩ ±10%; 0,33W	B 51263 A 10 K 10/5
R 51	1	25kΩ ±10%; 0,33W	B 51263 A 25 K 10/5
R 52	1	15kΩ ±10%; 0,33W	B 51263 A 15 K 10/5
R 53	1	200Ω ±20%; 0,33W	B 51263 A 200 Ω 20/5
R 54	1	2kΩ ±5%; 0,33W	B 51264 A 2 K 5/2
R 70 93	2	1kΩ ±10%; 0,33W	B 51263 A 1 K 10/5
R 73	1	500Ω ±10%; 0,33W	B 51263 A 500 Ω 10/5
R 98 149,164	3	1,2kΩ ±5%; 0,25W	B 51263 A 1,2 K 5/2
R 110	1	40kΩ ±5%; 0,25W	B 51263 A 40 K 5/2
R 118	1	2,5MΩ ±20%; 0,33W	B 51263 A 2,5 M 20/5
R 119	1	200kΩ ±20%; 0,33W	B 51263 A 200 K 20/5
R 145,160	2	1kΩ ±5%; 1,0W	B 51266 A 1 K 5/2
R 146,161	2	50kΩ ±5%; 0,25W	B 51263 A 50 K 5/2
R 148,163	2	2kΩ ±5%; 0,25W	B 51263 A 2 K 5/2
R 151,165	2	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 500Ω +20/-30%; 0,1W	500 Ω lin Rel wd 165a
R 152 166	2	Schichtwiderstand LAYER-TYPE RESISTOR 500Ω ±5%; 0,25W	B 51263 A 500 Ω 5/2
R 157	1	1,5kΩ ±5%; 0,25W	B 51263 A 1,5 K 5/2
R 168	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 10kΩ +20/-30%; 0,1W	10 kΩ lin Rel wd 165a
S 1	1	Drehschalter ROTARY SWITCH 1Am; 60V; 20W	Rel sch 197e/Tz1

Ts 1,3	2	Transistor TRANSISTOR	AUY 15
Ts 2,4	2		ADY 19
Ts 5	1		2 N 2218 (Fa. Motorola)
Ü 1,2,3	3	Übertrager (9 Rel sp 6c) TRANSFORMER Wicklg. I (ge,rt) 32 Wdg 0,12 CuL 3,0Ω 165µH Wicklg. II (gert,gn) 18 Wdg 0,11 CuL 2,1Ω	Rel Bv 622 P 3264

Komparator-Baugruppe Rel 35 D 549a1a (Ausgabe III)
COMPARATOR SUBASSEMBLY (ISSUE III)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA
C1-7	7	Styroflex-Kondensator STYROFLEX CAPACITOR 30pF ±1pF; 125V	B31140-A1300-A
C 10	1	MKL-Kondensator MKL CAPACITOR 1µF ±20%; 100V	B32110-C0105-M
Gr 1-7	7	Richtleiter CRYSTAL DIODE J_D = 20mA; U_{Sp} = 100V	OA 5 (Fa. Valvo)
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 1-5	5	10kΩ ±5%; 0,25W	B 51263 A 10 K 5/2
R 6-12	7	20kΩ ±5%; 0,25W	B 51263 A 20 K 5/2



Strombahnen auf der Rückseite
CURRENT PATHS ON THE REAR

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA	Seite PAGE
	1	Sägezahnverstärker SAWTOOTH AMPLIFIER	Rel Sk 35 D 580a1a	4.19
C 1,2	2	Elektrolyt-Kondensator ELEKTROLYTIC CAPACITOR 1µF +50/-20%; 110/110V	B41951-A9105-S	
C 3	1	Lufttrimmer AIR-DIELECTRIC TRIMMER 2...12pF 500V	Rel ko 130 fc	
C 4	1	Styroflex-Kondensator STYROFLEX CAPACITOR 20pF ±1pF; 125V	B31140-A1200-F	
C 5	1	MKH-Kondensator MKH CAPACITOR 0,047µF ±20%; 300V	B32220-A3473-M	
		MKL-Kondensator MKL CAPACITOR		
C 6	1	0,1µF ±20%; 100V	B32110-C0104-M	
C 7,8	2	2,2µF ±20%; 50V	B32110-C9225-M	
C 10	1	0,22µF ±20%; 50V	B32110-C9224-M	
C 11	1	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 250µF +50/-20%; 15/18V	B41611-A4257-S	
Gr 1,2	2	Germanium-Diode GERMANIUM DIODE J_D = 50mA; U_{Sp} = 100V	AAY 25	
Gr 3,4	2	-	OA 7 (Fa. Valvo)	
Gr 5	1	Zenerdiode ZENER DIODE J_Z = 100mA; U_Z = 5-6V	ZL 5 (Fa. Intermetall)	
Gr 6	1	J_Z = 100mA; U_Z = 7V	ZL 7 (Fa. Intermetall)	
Gr 7	1	J_Z = 12mA; r_Z=12Ω; V_Z = 12 V		
Gr 8,9	2	Diode DIODE J_D=100mA bei/AT 0,85V; U_{Sp}=80V	OA 182 (Fa. Telefunken)	

L 1	1	Spule (Rel sp 5i) COIL Wicklg. I (2,4) 25 Wdg 0,60 CuL 0,07Ω 67,6µH	Rel Bv 622 N 3389
		Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR	
P 6	1	50kΩ +20/-30%; 0,2W	50 kΩ lin 9 Rel wd 10b
P 7	1	5kΩ +20/-30%; 0,2W	5 kΩ lin 9 Rel wd 10c
P 8	1	100Ω +20/-30%; 0,2W	100 Ω lin 9 Rel wd 10c
P 9	1	Drahtspindel-Widerstand WIRE-WOUND SPINDLE RESISTOR 9Ω ±40%; 3W	B 58125 B 9 Ω 40
		Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR	
P 10	1	25kΩ +20/-30%; 0,1W	25 kΩ neg. log. 9 Rel wd 10c
P 11	1	5kΩ +20/-30%; 0,2W	5 kΩ lin 9 Rel wd 10 a
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 1,6	2	1MΩ ±10%; 0,5W	B 51264 A 1 M 10/5
R 2	1	40kΩ ±5%; 0,33W	B 51264 A 40 K 5/2
R 3	1	60kΩ ±5%; 0,33W	B 51264 A 60 K 5/2
R 5	1	2MΩ ±10%; 0,5W	B 51264 A 2 M 10/5
R 7,9	2	100Ω ±20%; 0,33W	B 51263 A 100 Ω 20/5
R 8,20	2	3kΩ ±5%; 0,33W	B 51264 A 3 K 5/2
R 10,22	2	1,5kΩ ±5%; 0,33W	B 51264 A 1,5 K 5/2
R 11	1	600Ω ±5%; 0,33W	B 51264 A 600 Ω 5/2
R 12	1	300Ω ±10%; 0,33W	B 51263 A 300 Ω 10/5
R 13	1	800Ω ±5%; 0,33W	B 51264 A 800 Ω 5/2
R 14	1	1kΩ ±5%; 0,33W	B 51264 A 1 K 5/2
R 15	1	3,57Ω ±1%; 0,15W	B 51264 A 3,57 Ω 1/0,5
R 16	1	13Ω ±1%; 0,15W	B 51264 A 13 Ω 1/0,5
R 17	1	300Ω ±2%; 1,0W	B 51267 A 300 Ω 2/2
R 18,19	2	3,2Ω ±1%; 0,5W	B 51266 A 3,2 Ω 1/0,5
R 21	1	60Ω ±5%; 0,5W	B 51265 A 60 Ω 5/2
R 23	1	6Ω ±1%; 3W	6 Ω 1% 0,5 DIN 41406 R
R 24	1	5Ω ±1%; 3W	5 Ω 1% 0,5 DIN 41406 R
R 25	1	3kΩ ±5%; 0,33W	B 51264 A 3 K 5/2
R 26	1	50Ω ±5%; 0,33W	B 51264 A 50 Ω 5/2
R 29	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 200Ω +20/-30%; 0,1W	200 Ω lin Rel wd 165a

		Schichtwiderstand LAYER-TYPE RESISTOR	
R 30	1	800Ω ±5%; 0,33W	B 51264 A 800 Ω 5/2
R 31	1	12,5kΩ ±1%; 0,25W	B 51265 A 12,5 K 1/0,5
R 40	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 500kΩ +20/-30%; 0,2W	500 kΩ lin 9 Rel wd 10 a
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 56	1	8,2kΩ ±5%; 0,25W	B 51263 A 8,2 K 5/2
R 57	1	1,8kΩ ±5%; 0,25W	B 51263 A 1,8 K 5/2
R 58	1	470Ω ±5%; 0,25W	B 51263 A 470 Ω 5/2
R 59	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 500Ω +20/-30%; 0,1W	500 Ω lin Rel wd 165a
R 60	1	Metallschichtwiderstand METALLIZED-TYPE RESISTOR 7,365kΩ±2%; 0,25W	AT.E-1/4-7,365 k-0,2% (Fa.Elettronica Metal-Lux Milano)
R 61	1	Schichtwiderstand LAYER-TYPE RESISTOR 2,2kΩ ±5%; 0,25W	B 51263 A 2,2 K 5/2
S 1	1	Schalter SWITCH 2polig; 1 Ebene; 2 Stellungen 2-POLE; 1 DECK; 2-POSITION	Rel sch 300aa Form B
		Transistor TRANSISTOR	
Ts 1	1		ACY 25
Ts 2,6	2		ADY 13
Ts 3	1		AUY 15
Ts 4,5,7	3		AUY 24
Ts 8,9	1		ACY 14
Ü 1	1	Übertrager (9 Rel sp 6b) TRANSFORMER Wicklg. I (ge,rt) 16 Wdg 0,35 CuL 0,19Ω Wicklg. II (gert/gn) 70 Wdg 0,20 CuL 2,2Ω 9,9...14,8mH Wicklg. III (gegn,gesw) 5 Wdg 0,20 CuL 0,25Ω 0,05...0,076mH	Rel Bv 622 P 3265

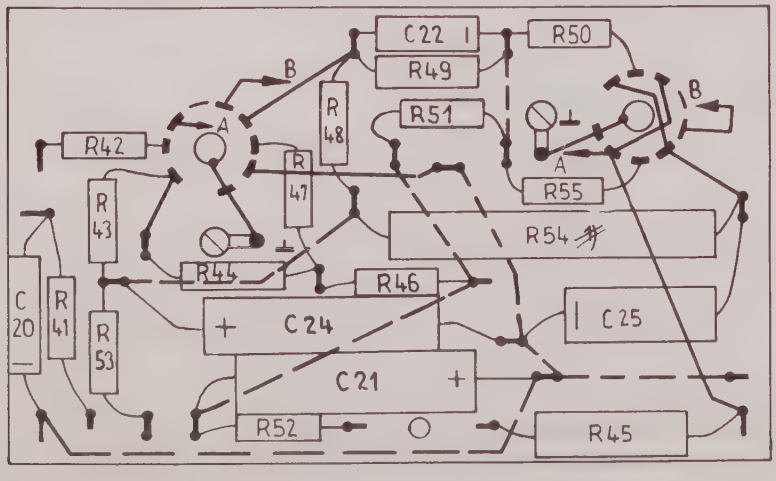
Ü 2 1 Übertrager (9 Rel sp 6b) Rel Bv 622 P 3266
TRANSFORMER

Wicklg. I (1,2,3,4)
27 Wdg 0,20 CuL 1,0Ω
1. Abgriff (2): 21 Wdg
2. Abgriff (3): 24 Wdg
1,46...2,23mH

Wicklg. II (5,6)
20 Wdg 0,20 CuL 0,7Ω
0,90...1,10mH

Sägezahnverstärker Rel 35 D 580a1a (Ausgabe III)
SAWTOOTH AMPLIFIER (ISSUE III)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA
C 20	1	MKL-Kondensator MKL CAPACITOR 0,1µF ±20%; 100V	B32110-C0104-M
C 21,24	2	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 2µF 250/275V	B43711-A2205-T
C 22	1	Styroflex-Kondensator STYROFLEX CAPACITOR 12pF ±1pF; 500V	B31141-A5120-F
C 25	1	MKH-Kondensator MKH CAPACITOR 0,047µF ±20%; 600V-	B32220-A6473-M
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 41	1	2,5MΩ ±5%; 0,5W	B 51264 A 2,5 M 5/2
R 42,47 50,55	4	100Ω ±20%; 0,33W	B 51263 A 100 Ω 20/5
R 43	1	100kΩ ±5%; 0,25W	B 51263 A 100 K 5/2
R 44,46 49	3	500kΩ ±5%; 0,33W	B 51264 A 500 K 5/2
R 45	1	10kΩ ±10%; 1,0W	B 51266 A 10 K 10/2
R 48	1	125kΩ ±5%; 0,25W	B 51263 A 125 K 5/2
R 51	1	1MΩ ±5%; 0,33W	B 51264 A 1 M 5/2
R 52	1	300kΩ ±5%; 0,25W	B 51263 A 300 K 5/2
R 53	1	400Ω ±5%; 0,25W	B 51263 A 400 Ω 5/2
R 54	1	4kΩ ±10%; 2,0W	B 51267 A 4 K 10/5



Netzteil Rel 35 D 437b1a (Ausgabe III)
POWER SUPPLY UNIT (ISSUE III)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA
		Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR	
C 1	1	50µF +50/-10%; 165V	B43651-B1506-T
C 2/3	1	50+50µF +50/-10%; 385V	B43731-A4107-T
C 4/5	1	100+100µF +50/-10%; 250/275V	B43731-A2207-T
C 6,12	2	16µF +50/-10%; 450/550V	B43651-B5166-T
C 7,8,9 10	4	2500µF +50/-20%; 15/18V	B41711-A4258-S
C 11	1	5000µF +50/-20%; 15/18V	B41711-A4508-S
C 14	1	25uF +50/-10%; 250/275V	B43651-B2256-T
C 13	1	MKH-Kondensator MKH-CAPACITOR 0,022µF ±20%; 300V	B32220-A3223-M
		Flachgleichrichter FLAT-TYPE RECTIFIER	
Gr 1	1	90V / 150mA	V23201-F1084
Gr 2 a,b	2	125V / 250mA	V23201-F1238
Gr 3 a,b	2	125V / 500mA	V23201-F1138
Gr 4	1	390V / 90mA	V23201-F1121
Gr 5,6,7,8	4	30V / 1200mA	V23201-F1092
Gr 9	1	Säulengleichrichter COLUMN RECTIFIER 1,5A / 20V-	PT 11a 22/1
L 1	1	Drossel (Zub tr M 55a) CHOKE	Rel Bv 621 F 3087
		Wicklg. I (2,3) 2470 Wdg 0,27 CuL 86Ω 2,2H	
L 2	1	Drossel (Zub tr M 74a) CHOKE	Rel Bv 621 H 3072
		Wicklg. I (2,3) 2910 Wdg 0,34 CuL 90Ω 58H	
L 3,4	2	Drossel (Zub tr M 42a) CHOKE	Rel Bv 621 E 3249
		Wicklg. I (2,3) 324 Wdg 0,60 CuL 1,76Ω 32mH	

P 14,15,16	3	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 100kΩ +20/-30%; 0,2W	100 kΩ lin 9 Rel wd 10 d
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 1	1	1,5MΩ ±5%; 0,33W	B 51264 A 1,5 M 5/2
R 2	1	1,5kΩ ±5%; 0,25W	B 51263 A 1,5 K 5/2
R 3,19	2	2MΩ ±5%; 0,33W	B 51264 A 2 M 5/2
R 4	1	2kΩ ±5%; 1,0W	B 51266 A 2 K 5/2
R 5	1	400kΩ ±5%; 0,33W	B 51263 A 400 K 5/2
R 6	1	600kΩ ±5%; 0,33W	B 51264 A 600 K 5/2
R 7	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 200kΩ +20/-30%; 0,1W	200 kΩ lin Rel wd 165a
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 8	1	800kΩ ±5%; 0,33W	B 51264 A 800 K 5/2
R 9	1	50kΩ ±5%; 1,0W	B 51266 A 50 K 2/2
R 12,13, 14,15	4	100kΩ ±10%; 0,33W	B 51263 A 100 K 10/5
R 20	1	50kΩ ±10%; 0,5W	B 51264 A 50 K 10/5
S 3	1	Netzschalter POWER SWITCH 250V/ 6A	Rel sch 171a
S 4	1	Spannungswähler VOLTAGE ADJUSTER	Rel sch 268a
Tr	1	Netztransformator POWER TRANSFORMER	Rel Bv 621 L 3116
		Wicklg. I (1a,2a,3a) 44 Wdg 0,80 CuL 0,27Ω 1. Abgriff (2a): 22 Wdg	
		Wicklg. II (3a,5a) 242 Wdg 0,60 CuL 2,5Ω	
		Wicklg. III (4a,6a) 242 Wdg 0,60 CuL 2,8Ω	
		Wicklg. IV (8c,1d) 745 Wdg 0,10 CuL 365Ω	
		Wicklg. V (2d,3d) 164 Wdg 0,10 CuL 90Ω	
		Wicklg. VI (4d,5d) 500 Wdg 0,25 CuL 38Ω	
		Wicklg. VII (7d,6d) 251 Wdg 0,25 CuL 16Ω	

Tr
Forts./CONT'D

Wicklg. VIII (9d,8d)
39 Wdg 0,37 CuL 1,6Ω

Wicklg. IX (1b,6b)
15 Wdg 3x1,10 CuL paral. 0,03Ω

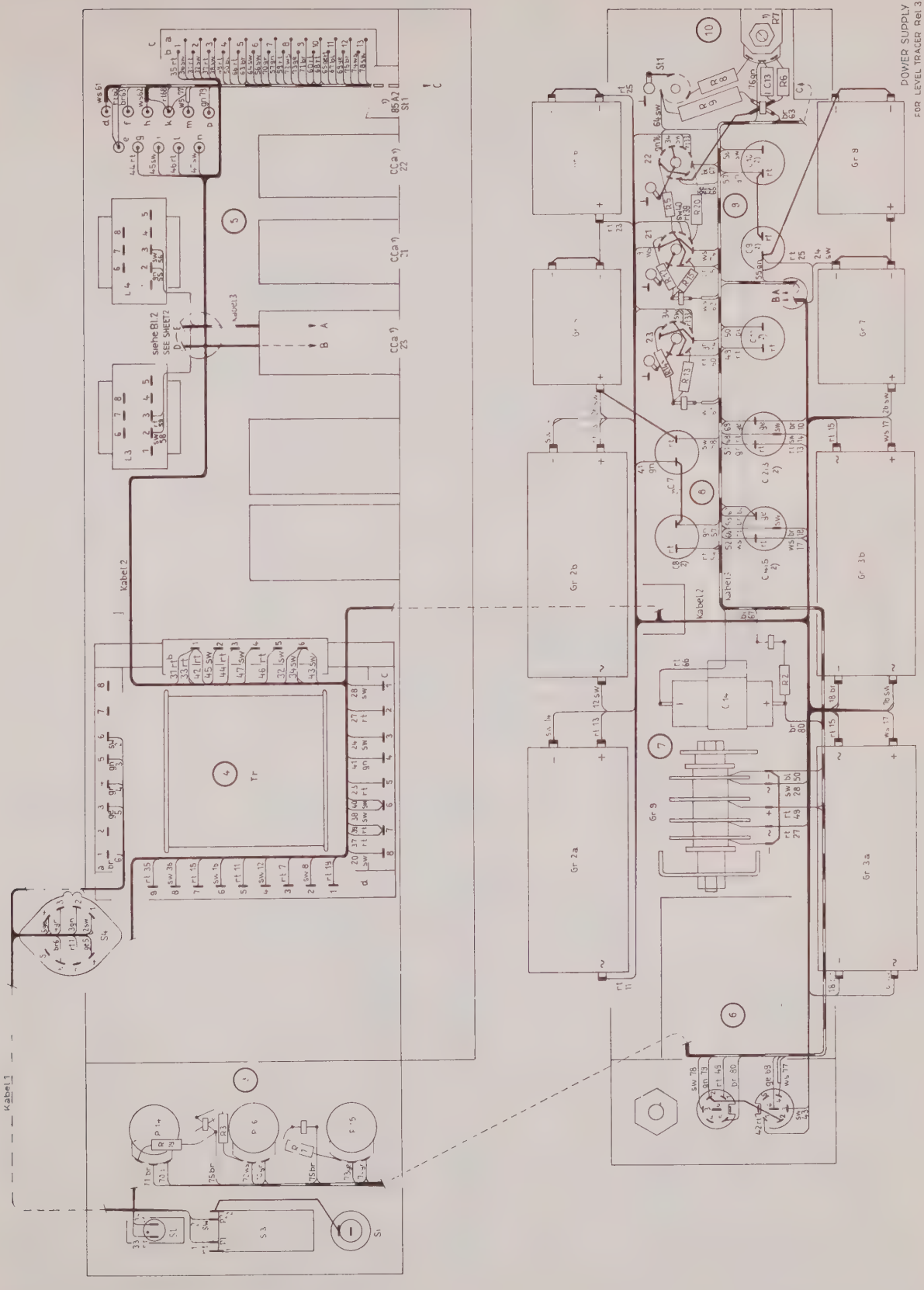
Wicklg. X (1c,2c)
22 Wdg 0,65 CuL 0,3Ω

Wicklg. XI (6c,7c)
15 Wdg 0,80 CuL 0,15Ω

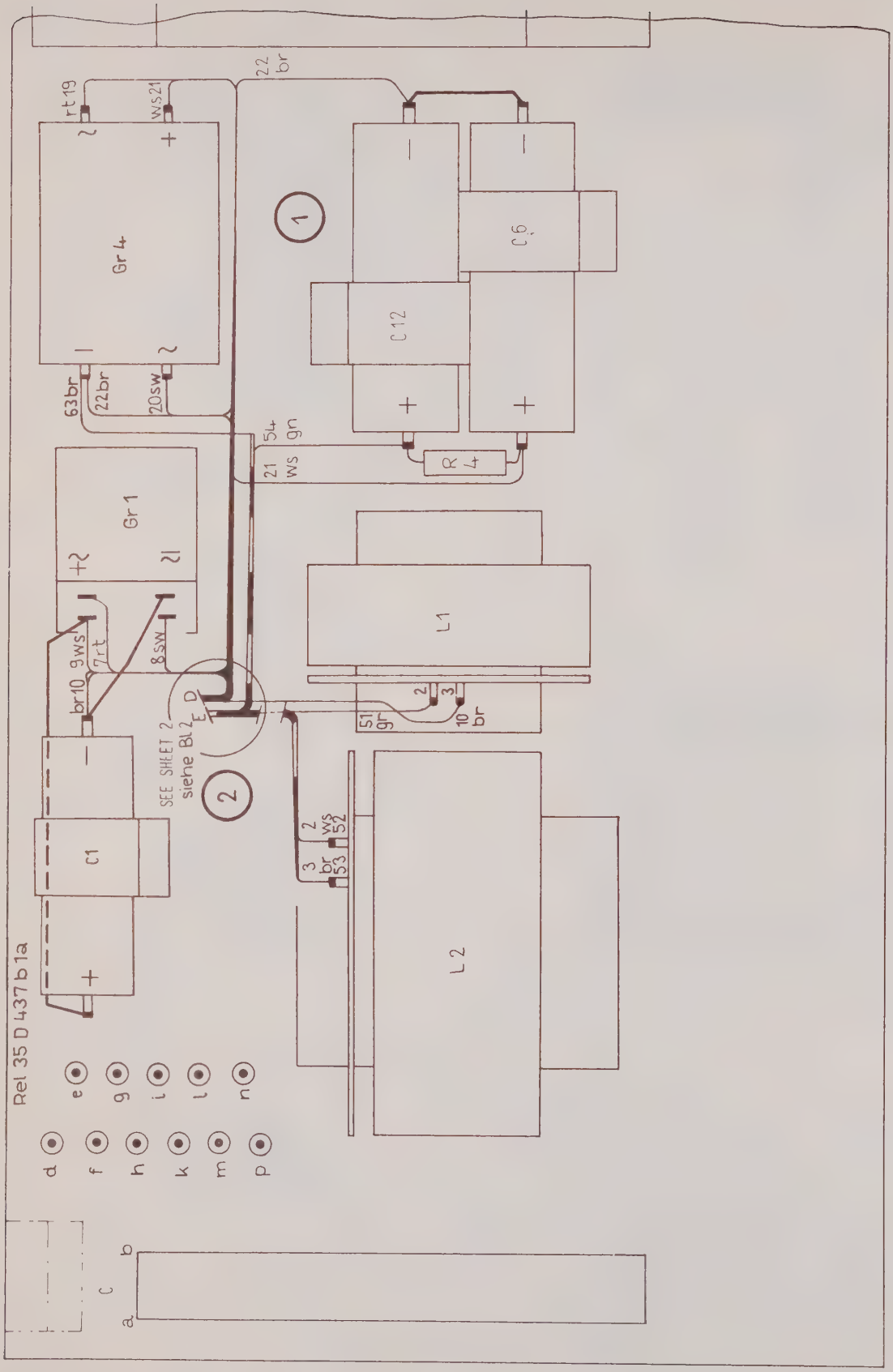
Wicklg. XII (5c,4c,3c)
48 Wdg 0,50 CuL 1,2Ω
1. Abgriff (4c): 24 Wdg

Wicklg. XIII (2b,3b)
84 Wdg 0,37 CuL 3,8Ω

Wicklg. XIV (4b,5b)
84 Wdg 0,37 CuL 3,8Ω



Netzteil Rel ms 35 D 437b1a (Ausgabe IV) Bl.1
POWER SUPPLY UNIT Rel ms 35 D 437b1a (ISSUE IV) Sheet 1



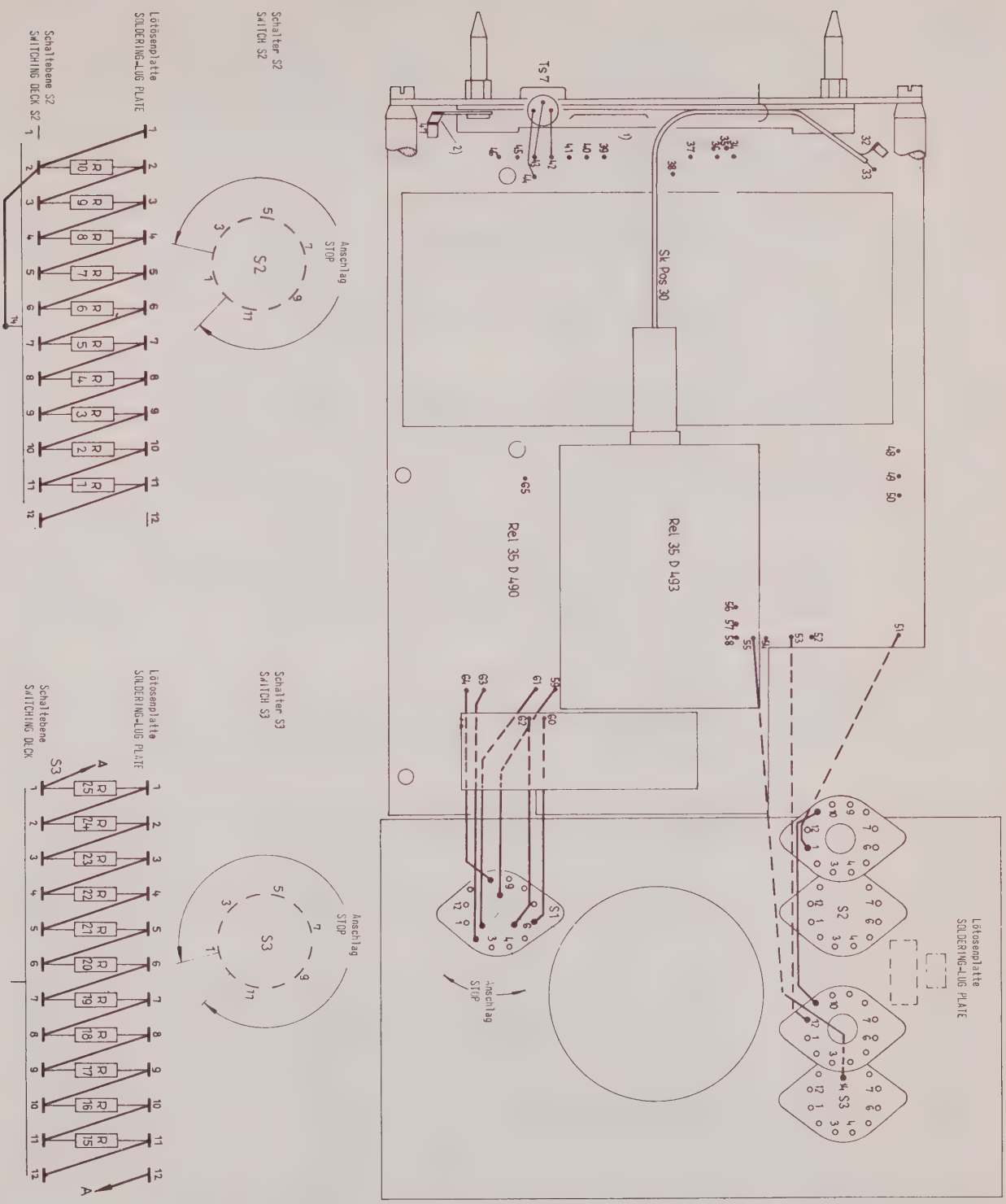
Netzteil Rel ms 35 D 437b1a (Ausgabe IV) Bl.2
POWER SUPPLY UNIT Rel ms 35 D 437b1a (ISSUE IV) Sh.2

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA	Seite PAGE
		Für Ausführung Rel 3 D 917b1a FOR MODEL		
	1	Verstärkerplatte AMPLIFIER BOARD	Rel Sk 35 D 490b1a	4.28
	1	Eichleitung ATTENUATOR	Rel Sk 35 D 493b1a	4.32
		für Ausführung Rel 3 D 917b2a FOR MODEL		
	1	Verstärkerplatte AMPLIFIER BOARD	Rel Sk 35 D 490b2a	4.28
		für Ausführung Rel 3 D 917b 2a,3a FOR MODEL		
	1	Eichleitung ATTENUATOR	Rel Sk 35 D 493b2a	4.32
		für Ausführung Rel 3 D 917b,3a FOR MODEL		
	1	Verstärkerplatte AMPLIFIER BOARD	Rel Sk 35 D 490b3a	4.28
		für Ausführung Rel 3 D 917b,1a FOR MODEL		
R 1-10	10	Schichtwiderstand LAYER-TYPE RESISTOR 137Ω ±1%; 0,1W	B 51263 A 137 Ω 1/0,5	
		Metallschichtwiderstand METALLIZED LAYER-TYPE RESISTOR		
R 15	1	951,6Ω ±0,2%; 1/8W	AT.E-1/8-95 1,6-0,2%	
R 16	1	861,0Ω ±0,2%; 1/8W	AT.E-1/8-861,0-0,2%	
R 17	1	779,2Ω ±0,2%; 1/8W	AT.E-1/8-779,2-0,2%	
R 18	1	705,0Ω ±0,2%; 1/8W	AT.E-1/8-705,0-0,2%	
R 19	1	637,9Ω ±0,2%; 1/8W	AT.E-1/8-637,9-0,2%	
R 20	1	577,2Ω ±0,2%; 1/8W	AT.E/8-577,2-0,2%	
R 21	1	522,3Ω ±0,2%; 1/8W	AT.E-1/8-522,3-0,2%	
R 22	1	472,6Ω ±0,2%; 1/8W	AT.E-1/8-472,6-0,2%	
R 23	1	427,6Ω ±0,2%; 1/8W	AT.E-1/8-427,6-0,2%	
R 24	1	386,9Ω ±0,2%; 1/8W	AT.E-1/8-386,9-0,2%	
R 25	1	350,1Ω ±0,2%; 1/8W	AT.E-1/8-350,1-0,2%	

+Fa.Elettronica Metal-Lux

	Für Ausführung Rel 3 D 917b 2a,3a FOR MODEL		
R 1-10	10	Schichtwiderstand LAYER-TYPE RESISTOR 167Ω ±1%; 0,1W	B 51263 A 167 Ω 1/0,5
		Metallschichtwiderstand METALLIZED LAYER-TYPE RESISTOR	
R 15	1	1,087kΩ ±0,2%; 1/8W	AT.W-1/8-1,087 K-0,2%
R 16	1	969,2Ω ±0,2%; 1/8W	AT.E-1/8-969,2-0,2%
R 17	1	863,8Ω ±0,2%; 1/8W	AT.E-1/8-863,8-0,2%
R 18	1	769,9Ω ±0,2%; 1/8W	AT.E-1/8-769,9-0,2%
R 19	1	686,2Ω ±0,2%; 1/8W	AT.E-1/8-686,2-0,2%
R 20	1	611,6Ω ±0,2%; 1/8W	AT.E-1/8-611,6-0,2%
R 21	1	545,0Ω ±0,2%; 1/8W	AT.E-1/8-545,0-0,2%
R 22	1	485,8Ω ±0,2%; 1/8W	AT.E-1/8-485,8-0,2%
R 23	1	432,9Ω ±0,2%; 1/8W	AT.E-1/8-432,9-0,2%
R 24	1	385,9Ω ±0,2%; 1/8W	AT.E-1/8-385,9-0,2%
R 25	1	343,9Ω ±0,2%; 1/8W	AT.E-1/8-343,9-0,2%
	für Ausführung Rel 3 D 917b 1a,2a,3a FOR MODEL		
S 1	1	Drehschalter ROTARY SWITCH	Rel sch 303a Form N
S 2,3	2	Drehschalter ROTARY SWITCH 1polig; 1 Ebene 12stufig 1-POLE; 1 DECK 12-STEP	Rel sch 175f Form B
Ts 7	1	Transistor TRANSISTOR	ADY 12

+Fa. Elettronica Metal-Lux



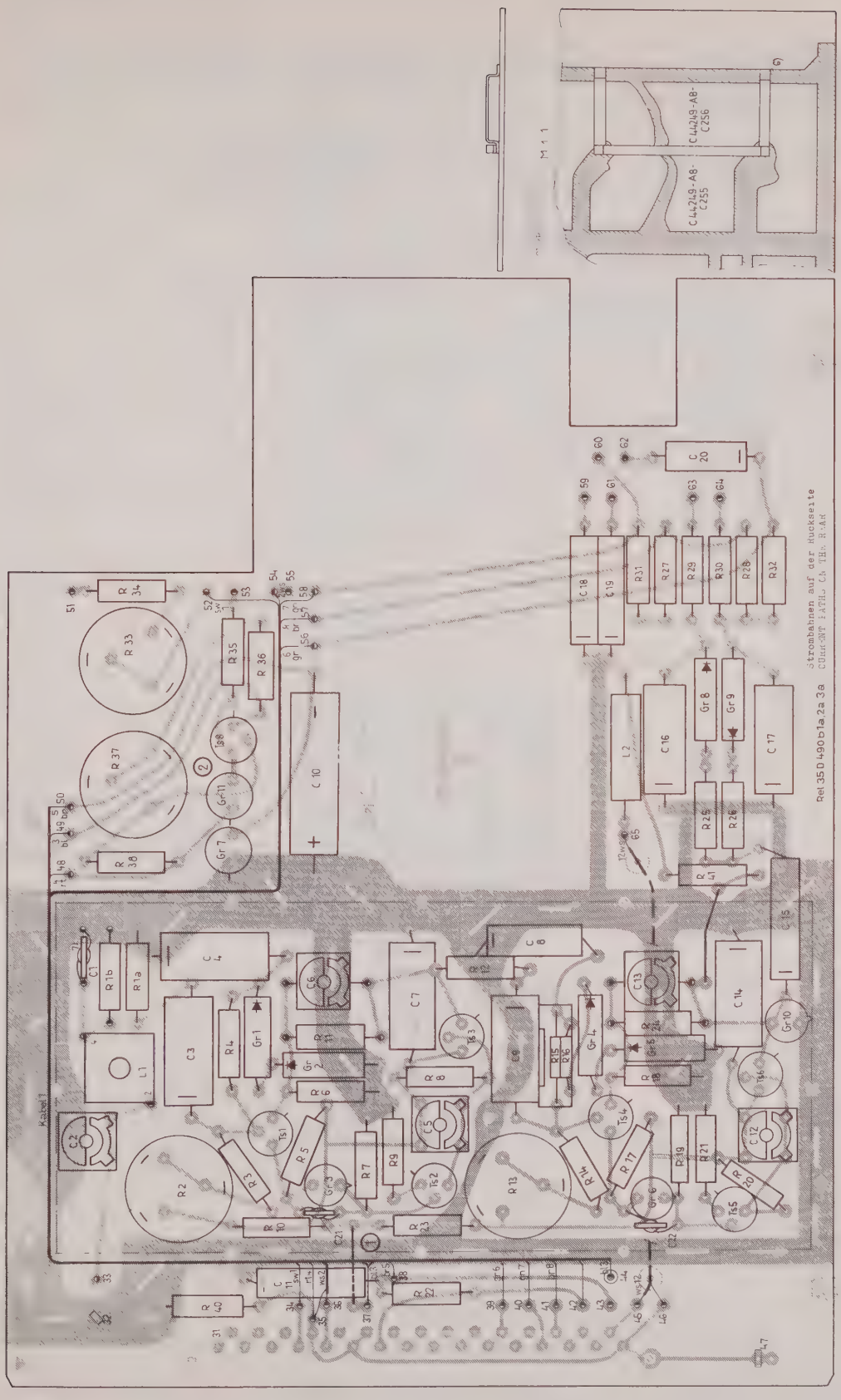
Breitbandverstärker 10 kHz bis 17 MHz Rel ms 3 D 917b 1a, 2a, 3a (Ausgabe II)
WIDEBAND AMPLIFIER 10 KC/S TO 17 MC/S Rel ms 3 D 917b 1a, 2a, 3a (ISSUE II)

Verstärkerplatte Rel 35 D 490b 1a,2a,3a (Ausgabe V)
AMPLIFIER BOARD (ISSUE V)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA
C 1	1	Keramik-Kondensator CERAMIC CAPACITOR 10pF ±1pF; 500V-	B 38218 N033 A 10 F
C 2,5 12	3	Lufttrimmer AIR DIELECTRIC TRIMMER	Rel ko 131f
C 3,4,7,9 14	5	MKL-Kondensator MKL CAPACITOR 1µF ±20%; 50V	B32110-C9105-M
C 6 13	2	Lufttrimmer AIR-DIELECTRIC TRIMMER 3-43pF ±15%; 250V	Rel ko 131c
C 8	1	MKL-Kondensator MKL CAPACITOR 0,15µF ±20%; 50V	B32110-C9154-M
C 10	1	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 25µF +50/-20%; 35/40V	B41951-B7256-S
		MKL-Kondensator MKL CAPACITOR	
C 11	1	0,22µF ±20%; 50V	B32110-C9224-M
C 15	1	0,22µF ±20%; 250V	B32110-C2224-M
C 16,17	2	Styroflex-Kondensator STYROFLEX CAPACITOR 3000pF ±2%; 250V	B31142-A2302-G
C 18,19	2	MKH-Kondensator MKH CAPACITOR 0,01µF ±20%; 300V	B32220-A3103-M
C 20	1	Styroflex-Kondensator STYROFLEX CAPACITOR 200pF ±5%; 500V	B31141-A5201-J
C 21,22	2	Keramik-Kondensator CERAMIC CAPACITOR 8000pF +30/-20%; 500V-	B37636-U8000-R
Gr 1,2,4,5	4	Richtleiter CRYSTAL DIODE J_D = 75mA; U_{Sp} = 25V	AAY 26
Gr 3,6	2	Zenerdiode ZENER DIODE J_Z = 5mA; U_Z=7-8V	Z 7 Fa. Intermetall

Gr 7	1	Zenerdiode ZENER DIODE J_Z=5mA; U_Z=18V; V_Z=110Ω	SZ 18 K St
		Richtleiter CRYSTAL DIODE	
Gr 8,9	2	J_D = 6mA; U_{Sp} = 15V	OA 160
Gr 10,11	2	J_D = 200mA; U_{Sp} = 100V	OA 5 (Fa. Valvo)
L 1	1	Spule COIL Wicklg. I (2,4) 3 Wdg 0,80 CuL 4Ω 80...115nH	Rel Bv 623 M 3049
L 1	1	Wicklg. I (2,4) 2 Wdg 0,80 CuL 3Ω 56...74nH	Rel Bv 623 M 3050
L 1	1	Wicklg. I (2,4) 4 Wdg 0,80 CuL 5Ω 100...165nH	Rel Bv 623 M 3051
L 2	1	UKW-Drossel UHF CHOKE 1A / 10µH	B 82501-A-C15
R 1a	1	Metallschichtwiderstand METALLIZED LAYER-TYPE RESISTOR 170Ω ±1%; 0,15W	MLAD-HF 0,15WTk50 1% 170Ω (Fa. Stemag)
R 1b	1	Schichtwiderstand LAYER-TYPE RESISTOR 2kΩ ±1%; 0,1%; 0,1W	B 51263 A 2 K 1/0,5
R 2,37	2	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 10kΩ +20/-30%; 0,1W	10 kΩ lin Rel wd 146d
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 3	1	4kΩ ±1%; 0,1W	B 51263 A 4 K 1/0,5
R 4	1	150Ω ±1%; 0,1W	B 51263 A 150 Ω 1/0,5
R 5,17,22	3	1,5kΩ ±5%; 0,25W	B 51263 A 1,5 K 5/2
R 6,18	2	50Ω ±1%; 0,1W	B 51263 A 50 Ω 1/0,5
R 7,19	2	1,2kΩ ±5%; 0,25W	B 51263 A 1,2 K 5/2
R 8,20	2	1kΩ ±5%; 0,25W	B 51263 A 1 K 5/2
R 9,21	2	50Ω ±5%; 0,25W	B 51263 A 50 Ω 5/2
R 10,23	2	15Ω ±5%; 0,25W	B 51263 A 15 Ω 5/2

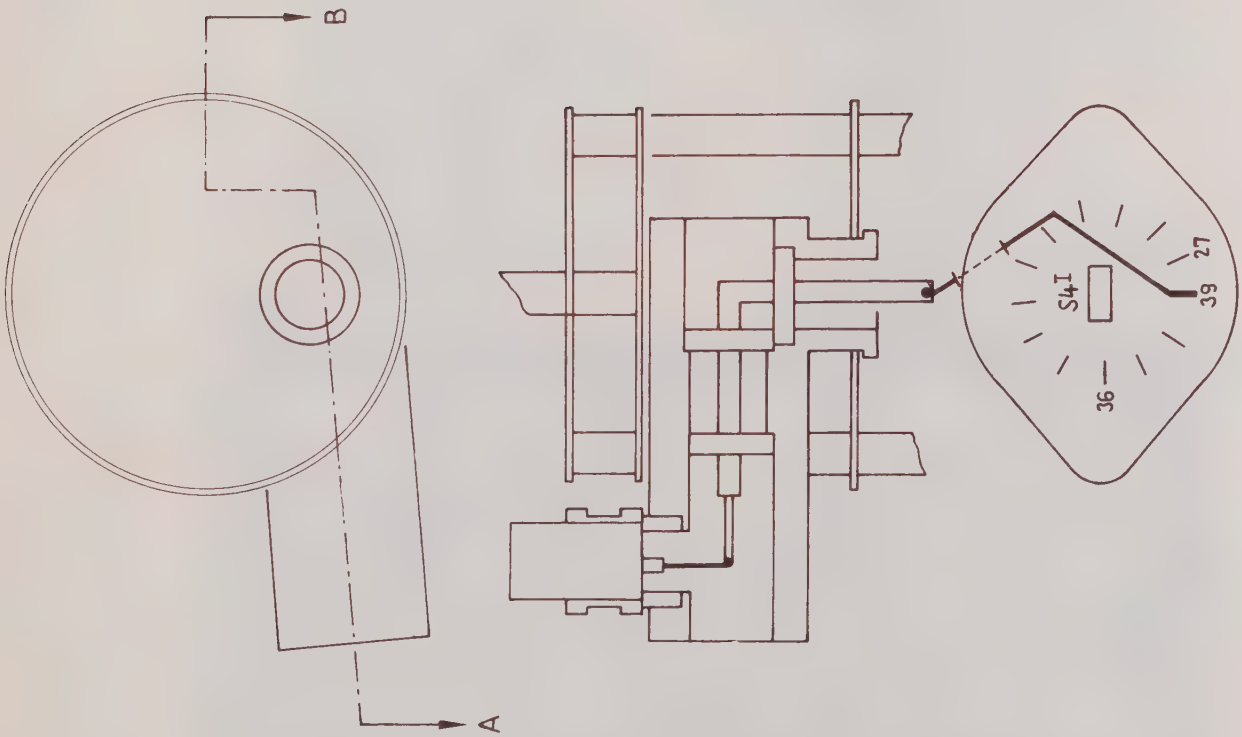
	Für Ausführung Rel 35 D 490b 1a,2a FOR MODEL		
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 11,24	2	920Ω ±1%; 0,1W	B 51263 A 920 Ω 1/0,5
	für Ausführung Rel 35 D 490b3a FOR MODEL		
R 11,24	2	860Ω ±1%; 0,1W	B 51263 A 860 Ω 1/0,5
R 12	1	60Ω ±5%; 0,25W	B 51263 A 60 Ω 5/2
R 13	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 20kΩ +20/-30%; 0,1W	20 kΩ lin Rel wd 146d
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 14,41	2	10kΩ ±5%; 0,25W	B 51263 A 10 K 5/2
R 15	1	300Ω ±5%; 0,25W	B 51263 A 300 Ω 5/2
R 16	1	400Ω ±5%; 0,25W	B 51263 A 400 Ω 5/2
R 25,26	2	100Ω ±1%; 0,1W	B 51263 A 100 Ω 1/0,5
R 27,28	2	40kΩ ±1%; 0,1W	B 51263 A 40 K 1/0,5
R 29,30	2	25Ω ±5%; 0,25W	B 51263 A 25 Ω 5/2
R 31,32	2	200kΩ ±5%; 0,25W	B 51263 A 200 K 5/2
R 33	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 1kΩ +20/-30%; 0,1W	1 kΩ lin Rel wd 146d
	für Ausführung Rel 35 D 490b1a FOR MODEL		
R 34	1	Schichtwiderstand LAYER-TYPE RESISTOR 3,3kΩ ±1%; 0,1W	B 51263 A 3,3 K 1/0,5
R 35	1	Metallschichtwiderstand METALLIZED LAYER-TYPE RESISTOR 3,329kΩ ±0,2%; 1/4W	AT.E.1/4-3,329K-0,2% Fa.Elettronica Metal-Lux
	für Ausführung Rel 35 D 490b2a,3a FOR MODEL		
R 34	1	Schichtwiderstand LAYER-TYPE RESISTOR 3kΩ ±1%; 0,1W	B 51263 A 3 K 1/0,5
R 35	1	Metallschichtwiderstand METALLIZED LAYER-TYPE RESISTOR 2,818kΩ ±0,2%; 1/4W	AT.E-1/4-2,818K-0,2%
	für Ausführung Rel 35 D 490b 1a,2a,3a FOR MODEL		
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 36	1	8kΩ ±5%; 0,25W	B 51263 A 8 K 5/2
R 38	1	2kΩ ±5%; 0,25W	B 51263 A 2 K 5/2
R 40	1	5Ω ±5%; 0,33W	B 51264 A 5 Ω 5/2
Ts 1-6	6	Mesa-Transistor	2 N 1143 (Fa. Texax)
Ts 8	1	Transistor	ASY 11



Verstärkerplatte Rel ms 35 D 490b 1a, 2a, 3a (Ausgabe II)
AMPLIFIER BOARD Rel ms 35 D 490b 1a, 2a, 3a (ISSUE II)

Eichleitung 0 bis 35 dB, 0...3,5 Np Rel 35 D 493b 1a,2a (Ausgabe III)
ATTENUATOR 0 TO 35 DB, 0-3.5 N (ISSUE III)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA
		Für Ausführung Rel 35 D 493b1a FOR MODEL	
	1	Schalterbaugruppe SWITCH SUBASSEMBLY	Rel 35 D 498b1a
		für Ausführung Rel 35 D 493b2a FOR MODEL	
	1	Schalterbaugruppe SWITCH SUBASSEMBLY	Rel 35 D 498b2a



Eichleitung 0 bis 35 dB Rel ms 35 D 493b 1a, 2a (Ausgabe II)
ATTENUATOR 0 TO 35 dB Rel ms 35 D 493b 1a, 2a (ISSUE II)

Schalterbaugruppe Rel 35 D 498b 1a,2a (Ausgabe IV)
SWITCH SUBASSEMBLY (ISSUE IV)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA
C 1	1	Keramik-Kondensator CERAMIC CAPACITOR 3,2pF ±0,25pF; 500V-	B 38215 N075 A 3,2 C
		für Ausführung Rel 35 D 498a1a FOR MODEL	
		Metallschichtwiderstand METALLIZED LAYER-TYPE RESISTOR	
R 1,21	2	306,22Ω ±0,2%; 1/4W	AFL.AW-1/4-306,22-0,2%
R 2	1	162,3Ω ±0,2%; 1/4W	AFL.AW-1/4-162,3-0,2%
R 3	1	118,08Ω ±0,2%; 1/4W	AFL.AW-1/4-118,08-0,2%
R 4,18	2	98,48Ω ±0,2%; 1/4W	AFL.AW-1/4-98,48-0,2%
R 5,17	2	88,41Ω ±0,2%; 1/4W	AFL.AW-1/4-88,41-0,2%
R 6,16	2	82,86Ω ±0,2%; 1/4W	AFL.AW-1/4-82,86-0,2%
R 7,15	2	79,67Ω ±0,2%; 1/4W	AFL.AW-1/4-79,67-0,2%
R 8	1	39,08Ω ±0,2%; 1/4W	AFL.AW-1/4-39,08-0,2%
R 9	1	88,14Ω ±0,2%; 1/4W	AFL.AW-1/4-88.14-0,2%
R 10	1	159,7Ω ±0,2%; 1/4W	AFL.AW-1/4-159,7-0,2%
R 11	1	272,0Ω ±0,2%; 1/4W	AFL.AW-1/4-272,0-0,2%
R 12	1	453,8Ω ±0,2%; 1/4W	AFL.AW-1/4-453,_-0,2%
R 13	1	751,3Ω ±0,2%; 1/8W	AFL.AW-1/8-751,3-0,2%
R 14	1	1240,7Ω ±0,2%; 1/8W	AFL.AW-1/8-1240,7-0,2%
R 19	1	118,08Ω ±0,2%; 1/4W	AFL.AW-1/4-118,08-0,2%
R 20	1	162,3Ω ±0,2%; 1/4W	AFL.AW-1/4-162,3-0,2%
		für Ausführung Rel 35 D 498a2a FOR MODEL	
R 1,21	2	267,76Ω ±0,2%; 1/4W	AFL.AW-1/4-267,76-0,2%
R 2	1	144,5Ω ±0,2%; 1/4W	AFL.AW-1/4-144,5-0,2%
R 3	1	107,44Ω ±0,2%; 1/4W	AFL.AW-1/4-107,44-0,2%
R 4,18	2	91,65Ω ±0,2%; 1/4W	AFL.AW-1/4-91,65-0,2%
R 5,17	2	83,94Ω ±0,2%; 1/4W	AFL.AW-1/4-83,94-0,2%
R 6,16	2	79,87Ω ±0,2%; 1/4W	AFL.AW-1/4-79,87-0,2%
R 7,15	2	77,72Ω ±0,2%; 1/4W	AFL.AW-1/4-77,72-0,2%
R 8	1	45,59Ω ±0,2%; 1/4W	AFL.AW-1/4-45,59-0,2%
R 9	1	106,6Ω ±0,2%; 1/4W	AFL.AW-1/4-106,6-0,2%
R 10	1	204,2Ω ±0,2%; 1/4W	AFL.AW-1/4-204,2-0,2%
R 11	1	371Ω ±2%; 1/4W	AFL.AW-1/4-371 -0,2%
R 12	1	664,73Ω ±0,2%; 1/4W	AFL.AW-1/4-664,73-0,2%
R 13	1	1183Ω ±0,2%; 1/8W	AFL.AW-1/8-1183-0,2%
R 14	1	2108Ω ±0,2%; 1/8W	AFL.AW-1/8-2108-0,2%
R 19	1	107,44Ω ±0,2%; 1/4W	AFL.AW-1/4-107,44-0,2%
R 20	1	144,5Ω ±0,2%; 1/4W	AFL.AW-1/4-144,5-0,2%

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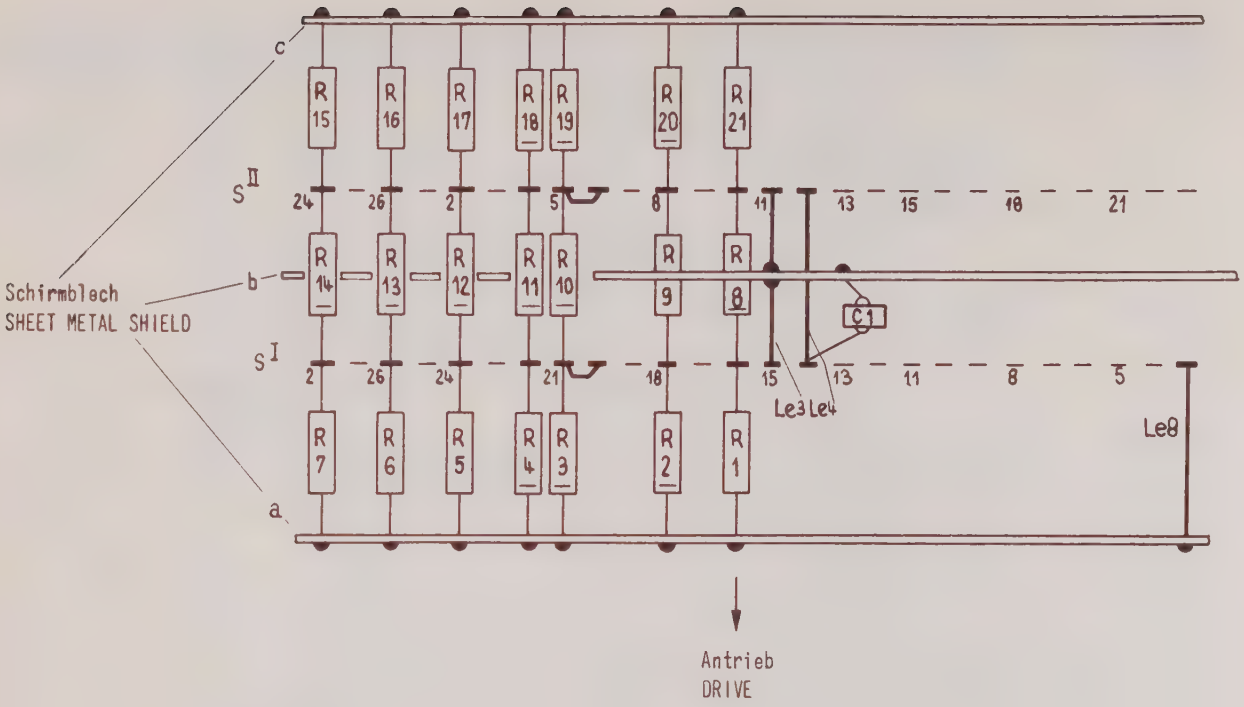

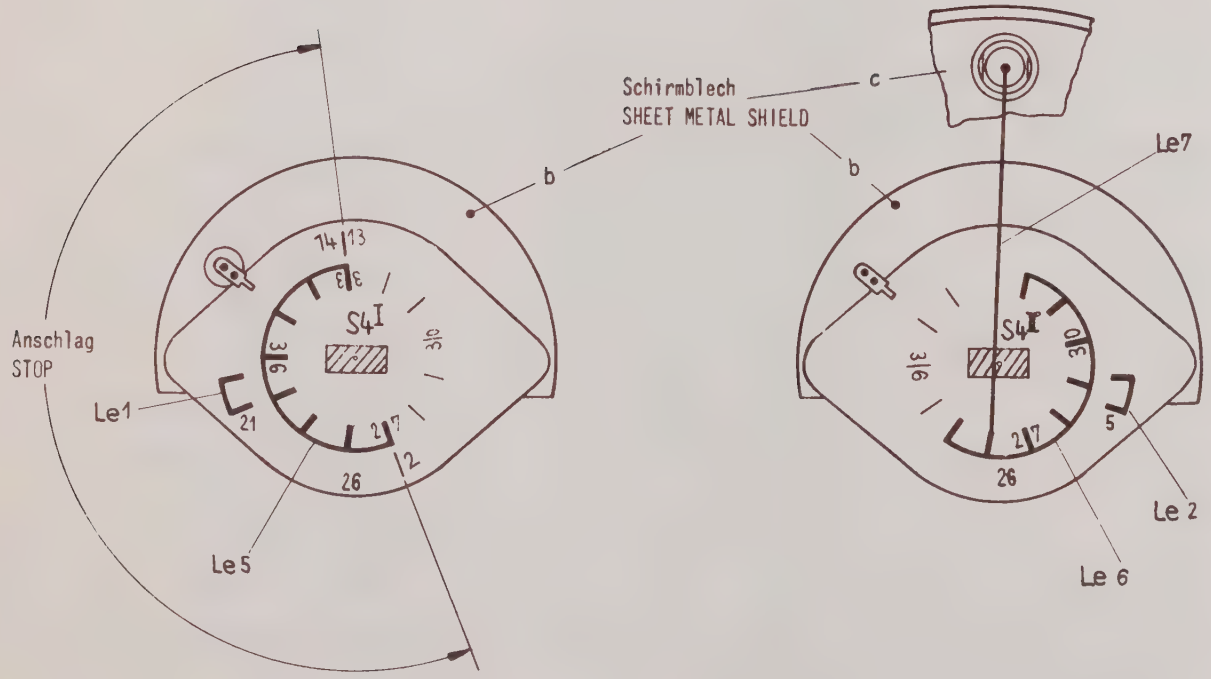

Schalterbaugruppe Rel ms 35 D498b 1a, 2a (Ausgabe II)
SWITCH SUBASSEMBLY Rel ms 35 D 498b 1a, 2a (ISSUE II)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA	Seite PAGE
	1	ZF-Verstärkerplatte IF AMPLIFIER BOARD	Rel Sk 35 D 473b1a	4.38
C 1	1	MKH-Kondensator MKH CAPACITOR 0,047µF ±20%; 300V	B32220-A3473-M	
C 2	1	Styroflex-Kondensator STYROFLEX CAPACITOR 1000pF ±5%; 125V	B31140-A1102-J	
C 3	1	Keramik-Kondensator CERAMIC CAPACITOR 20pF ±10%; 500V	B38121-J5200-K	
	für Ausführung Rel 3 D 916b1a FOR MODEL			
		Schichtwiderstand LAYER-TYPE RESISTOR		
R 1	1	57kΩ ±5%; 0,25W	B 51263 A 57 K 5/2	
R 2	1	81,5kΩ ±5%; 0,25W	B 51263 A 81,5 K 5/2	
R 3	1	155kΩ ±5%; 0,25W	B 51263 A 155 K 5/2	
R 4	1	1,554kΩ ±0,5%; 0,15W	B 51264 A 1,554 K 0,5/0,5	
R 5	1	3,272kΩ ±0,5%; 0,15W	B 51264 A 3,272 K 0,5/0,5	
R 6	1	5,170kΩ ±0,5%; 0,15W	B 51264 A 5,170 K 0,5/0,5	
	für Ausführung Rel 3 D 916b 1a,2a FOR MODEL			
R 7	1	15kΩ ±0,5%; 0,15W	B 51264 A 15 K 0,5/0,5	
	für Ausführung Rel 3 D 916b,1a FOR MODEL			
R 10	1	3,3kΩ ±1%; 0,1W	B 51263 A 3,3 K 1/0,5	
R 11-20	10	143Ω ±1%; 0,1W	B 51263 A 143 Ω 1/0,5	
	für Ausführung Rel 3 D 916b,2a FOR MODEL			
R 10	1	3kΩ ±1%; 0,1W	B 51263 A 3 K 1/0,5	
R 11-20	1	174Ω ±1%; 0,1W	B 51263 A 174 Ω 1/0,5	
	für Ausführung Rel 3 D 916b,1a FOR MODEL			
		Metallschichtwiderstand METALLIZED LAYER-TYPE RESISTOR		
R 21	1	951,6Ω ±0,2%; 1/8W	AT.E-1/8-951,6-0,2%+	
R 22	1	861,0Ω ±0,2%; 1/8W	AT.E-1/8-861,0-0,2%+	
R 23	1	779,2Ω ±0,2%; 1/8W	AT.E-1/8-779,2-0,2%+	

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Metallschichtwiderstand
METALLIZED LAYER-TYPE RESISTOR

für Ausführung Rel 3 D 916b1a
FOR MODEL

R 24	1	705,0Ω ±0,2%;	1/8W	AT.E-1/8-705,0-0,2%+
R 25	1	637,9Ω ±0,2%;	1/8W	AT.E-1/8-637,9-0,2%+
R 26	1	577,2Ω ±0,2%;	1/8W	AT.E-1/8-577,2-0,2%+
R 27	1	522,3Ω ±0,2%;	1/8W	AT.E-1/8-522,3-0,2%+
R 28	1	472,6Ω ±0,2%;	1/8W	AT.E-1/8-472,6-0,2%+
R 29	1	427,6Ω ±0,2%;	1/8W	AT.E-1/8-427,6-0,2%+
R 30	1	386,9Ω ±0,2%;	1/8W	AT.E-1/8-386,9-0,2%+
R 31	1	350,1Ω ±0,2%;	1/8W	AT.E-1/8-350,1-0,2%+
R 32	1	3,329kΩ ±0,2%;	1/4W	AT.E-1/4-3,329 K-0,2%+

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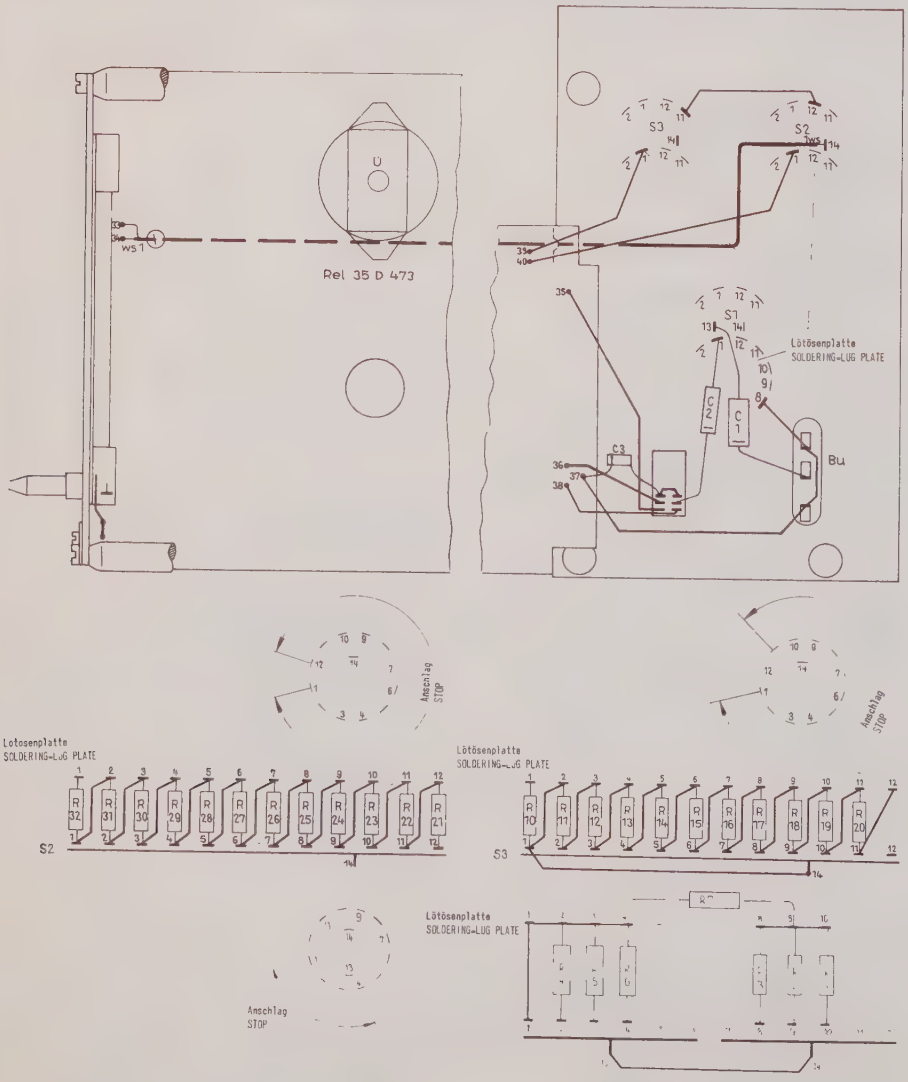

ZF-Verstärker Rel ms 3 D 916b 1a, 2a (Ausgabe II)
IF-AMPLIFIER Rel ms 3 D 916b 1a, 2a (ISSUE II)

Für Ausführung Rel 3 D 916b2a
FOR MODEL

Schichtwiderstand
LAYER-TYPE RESISTOR

R 1	1	50kΩ ±5%; 0,25W	B 51263 A 50 K 5/2
R 2	1	70kΩ ±5%; 0,25W	B 51263 A 70 K 5/2
R 3	1	136kΩ ±5%; 0,25W	B 51263 A 136 K 5/2
R 4	1	1,803kΩ ±0,5%; 0,15W	B 51264 A 1,803 K 0,5/0,5
R 5	1	3,826kΩ ±0,5%; 0,15W	B 51264 A 3,826 K 0,5/0,5
R 6	1	6,098kΩ ±0,5%; 0,15W	B 51264 A 6,098 K 0,5/0,5

Metallschichtwiderstand
METALLIZED LAYER-TYPE RESISTOR

R 21	1	1,087kΩ ±0,2%; 1/8W	AT.E-1/8-1,087 K-0,2%
R 22	1	969,2Ω ±0,2%; 1/8W	AT.E-1/8-969,2-0,2%
R 23	1	863,8Ω ±0,2%; 1/8W	AT.E-1/8-863,8-0,2%
R 24	1	769,9Ω ±0,2%; 1/8W	AT.E-1/8-769,9-0,2%
R 25	1	686,2Ω ±0,2%; 1/8W	AT.E-1/8-686,2-0,2%
R 26	1	611,6Ω ±0,2%; 1/8W	AT.E-1/8-611,6-0,2%
R 27	1	545,0Ω ±0,2%; 1/8W	AT.E-1/8-545,0-0,2%
R 28	1	485,8Ω ±0,2%; 1/8W	AT.E-1/8-485,8-0,2%
R 29	1	432,9Ω ±0,2%; 1/8W	AT.E-1/8-432,9-0,2%
R 30	1	385,9Ω ±0,2%; 1/8W	AT.E-1/8-385,9-0,2%
R 31	1	343,9Ω ±0,2%; 1/8W	AT.E-1/8-343,9-0,2%
R 32	1	2,818kΩ ±0,2%; 1/4W	AT.E-1/4-2,818 K-0,2%

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für Ausführung Rel 3 D 916b 1a,2a
FOR MODEL

Drehschalter
ROTARY SWITCH

S 1	1	2polig; 1 Ebene; 12stufig 2-POLE; 1 DECK; 12-STEP	Rel sch 176f Form B
S 2,3	2	1polig; 1 Ebene; 12stufig 1-POLE; 1 DECK; 12-STEP	Rel sch 175f Form B
S 4	1	Drehschalter ROTARY SWITCH 2 Umschaltkontakte 2 TRANSFER CONTACTS	Rel sch 197g, Tz 16

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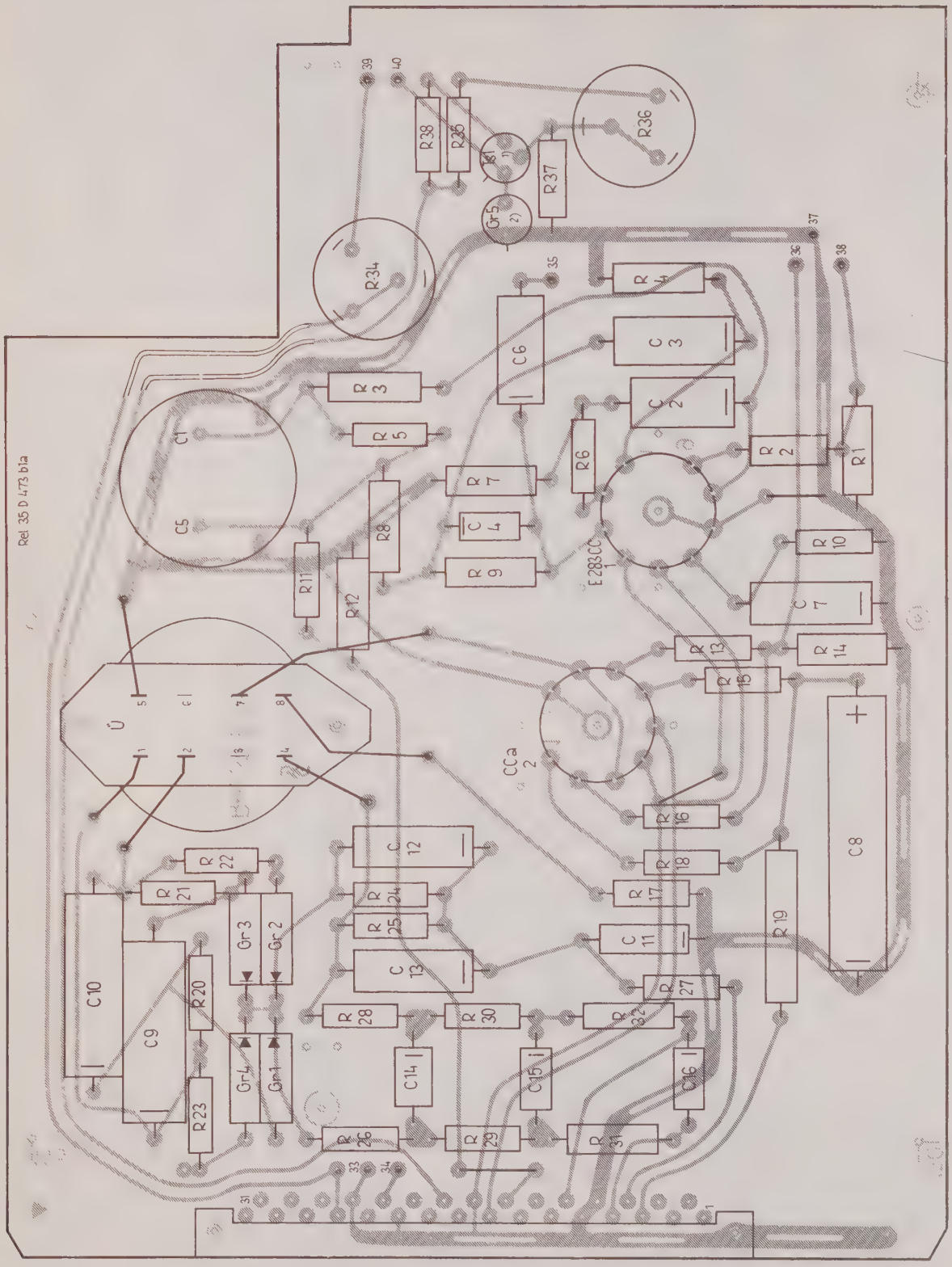
ZF-Verstärkerplatte Rel 35 D 473b1a (Ausgabe IV)
IF-AMPLIFIER BOARD (ISSUE IV)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA
C 1/5	1	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 25+25µF 350/385V	B 43298 A 25+25/350
		MKH-Kondensator MKH CAPACITOR	
C 2,6	2	0,047µF ±20%; 300V	B32220-A3473-M
		0,1µF ±20%; 300V	B32220-A3104-M
C 4	1	Styroflex-Kondensator STYROFLEX CAPACITOR 50pF ±1%; 125V	B31140-A1500-F
		Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR	
C 7	1	25µF +50/-20%; 6/8V	B41951-B2256-S
C 8	1	8µF +50/-10%; 150/165V	B43711-A1805-T
C 9,10	2	15000pF ±2%; 125V	B31143-A1153-G
C 11	1	2000pF ±5%; 125V	B31141-A1202-J
		Styroflex-Kondensator STYROFLEX CAPACITOR	
C 12,13	2	4000pF ±5%; 125V	B31142-A1402-J
C 14	1	2000pF ±5%; 125V	B31140-A1202-J
C 15	1	800pF ±5%; 125V	B31140-A1801-J
C 16	1	340pF ±5%; 125V	B31140-A1341-J
		Germanium-Diode GERMANIUM DIODE	
Gr 1-4	4	J_D = 50mA; U_{Sp} = 100V	AAY 25
Gr 5	1	J_D = 200mA; U_{Sp} = 100V	OA 5
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 1,7,14	3	1MΩ ±5%; 0,33W	B 51264 A 1 M 5/2
R 2,6,13,16	4	1kΩ ±5%; 0,25W	B 51263 A 1 K 5/2
R 3,12	2	500kΩ ±5%; 0,33W	B 51264 A 500 K 5/2
R 4	1	3kΩ ±0,5%; 0,15W	B 51264 A 3 K 0,5/0,5
R 5	1	5kΩ ±5%; 0,25W	B 51263 A 5 K 5/2
R 8	1	6kΩ ±0,5%; 0,15W	B 51264 A 6 K 0,5/0,5
R 9	1	20kΩ ±0,5%; 0,15W	B 51264 A 20 K 0,5/0,5
R 10	1	500Ω ±5%; 0,25W	B 51263 A 500 Ω 5/2
R 11,20,21 22,23	5	10kΩ ±5%; 0,25W	B 51263 A 10 K 5/2

		Schichtwiderstand LAYER-TYPE RESISTOR	
R 15,18	2	100Ω ±5%; 0,25W	B 51263 A 100 Ω 5/2
R 17	1	40Ω ±5%; 0,25W	B 51263 A 40 Ω 5/2
R 19	1	1kΩ ±5%; 0,25W	B 51265 A 1 K 5/2
R 24,25	2	50kΩ ±5%; 0,25W	B 51263 A 50 K 5/2
R 26,27,28	3	100kΩ ±5%; 0,25W	B 51263 A 100 K 5/2
R 29,30	2	250kΩ ±5%; 0,25W	B 51263 A 250 K 5/2
R 31,32	2	600kΩ ±5%; 0,33W	B 51264 A 600 K 5/2
R 34	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 1kΩ +20/-30%; 0,1W	1 kΩ lin wd 146d
R 35	1	Schichtwiderstand LAYER-TYPE RESISTOR 13kΩ ±5%; 0,25W	B 51263 A 13 K 5/2 B 51263 A 13 K 5/2
R 36	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 10kΩ +20/-30%; 0,1W	10 kΩ lin Rel wd 146d
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 37	1	1kΩ ±5%; 0,25W	B 51263 A 1 K 5/2
R 38	1	3,5kΩ ±5%; 0,25W	B 51263 A 3,5 K 5/2
Ts 1	1	Transistor TRANSISTOR	ASY 11
Ü	1	Übertrager (Rel sp 78b) TRANSFORMER Wicklg. I (1,4) 505 Wdg 0,12 CuL 58Ω 147,5...163,5mH Wicklg. II (2,4) 505 Wdg 0,12 CuL 58Ω Induktivität II=I±3mH, ÜI/II = 1±1% Wicklg. III (7,8) 706 Wdg 0,15 CuL 60Ω ÜIII/I = 1,4 ±3%	Rel Bv 622 U 3020



ZF-Verstärkerplatte Rel ms 35 D 473b 1a (Ausgabe II)
IF-AMPLIFIER Rel ms 35 D 473b 1a (ISSUE II)

		Schichtwiderstand LAYER-TYPE RESISTOR	
		Für Ausführung Rel 3 D 916c 1a,2a FOR MODEL	
R 7	1	15kΩ ±0,5%; 0,15W	B 51264 A 15 K 0,5/0,5
R 8	1	20kΩ ±5%; 0,25W	B51263-A2203-J
R 9	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 100kΩ +20/-30%; 0,1W	100 kΩ lin Rel wd 165b
		für Ausführung Rel 3 D 916c1a FOR MODEL	
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 10	1	3,3kΩ ±1%; 0,1W	B 51263 A 3,3 K 1/0,5
R 11-20	10	143Ω ±1%; 0,1W	B 51263 A 143 Ω 1/0,5
		für Ausführung Rel 3 D 916c2a FOR MODEL	
R 10	1	3kΩ ±1%; 0,1W	B 51263 A 3 K 1/0,5
R 11-20	10	174Ω ±1%; 0,1W	B 51263 A 174 Ω 1/0,5
		für Ausführung Rel 3 D 916c1a FOR MODEL	
		Metallschichtwiderstand METALLIZED LAYER-TYPE RESISTOR	
R 21	1	951,6Ω ±0,2%; 1/8W	AT.E-1/8-951,6-0,2%
R 22	1	861,0Ω ±0,2%; 1/8W	AT.E-1/8-861,0-0,2%
R 23	1	779,2Ω ±0,2%; 1/8W	AT.E-1/8-779,2-0,2%
R 24	1	705,0Ω ±0,2%; 1/8W	AT.E-1/8-705,0-0,2%
R 25	1	637,9Ω ±0,2%; 1/8W	AT.E-1/8-637,9-0,2%
R 26	1	577,2Ω ±0,2%; 1/8W	AT.E-1/8-577,2-0,2%
R 27	1	522,3Ω ±0,2%; 1/8W	AT.E-1/8-522,3-0,2%
R 28	1	472,6Ω ±0,2%; 1/8W	AT.E-1/8-472,6-0,2%
R 29	1	427,6Ω ±0,2%; 1/8W	AT.E-1/8-427,6-0,2%
R 30	1	386,9Ω ±0,2%; 1/8W	AT.E-1/8-386,9-0,2%
R 31	1	350,1Ω ±0,2%; 1/8W	AT.E-1/8-350,1-0,2%
R 32	1	3,329kΩ ±0,2%; 1/4W	AT.E-1/4-3,329 K-0,2%

+ Fa. Elettronica Metal-Lux

ZF-Verstärker Rel 3 D 916c 1a,2a (Ausgabe I)
IF AMPLIFIER

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA	Seite PAGE
	1	**ZF-Verstärkerplatte** **IF AMPLIFIER BOARD**	**Rel 35 D 473c1a**	4.40
C 1	1	MKH-Kondensator MKH CAPACITOR 0,047µF ±20%; 300V	B32220-A3473-M	
C 2	1	Styroflex-Kondensator STYROFLEX CAPACITOR 1000pF ±5%; 125V	B31140-A1102-J	
	für Ausführung Rel 3 D 916c1a FOR MODEL			
		Schichtwiderstand LAYER-TYPE RESISTOR		
R 1	1	57kΩ ±5%; 0,25W	B 51263 A 57 K 5/2	
R 2	1	81,5kΩ ±5%; 0,25W	B 51263 A 81,5 K 5/2	
R 3	1	155kΩ ±5%; 0,25W	B 51263 A 1,55 K 5/2	
R 4	1	1,554kΩ ±0,5%; 0,15W	B 51264 A 1,554 K 0,5/0,5	
R 5	1	3,272kΩ ±0,5%; 0,15W	B 51264 A 3,272 K 0,5/0,5	
R 6	1	5,170kΩ ±0,5%; 0,15W	B 51264 A 5,170 K 0,5/0,5	
	für Ausführung Rel 3 D 916c2a FOR MODEL			
R 1	1	50kΩ ±5%; 0,25W	B 51263 A 50 K 5/2	
R 2	1	70kΩ ±5%; 0,25W	B 51263 A 70 K 5/2	
R 3	1	136kΩ ±5%; 0,25W	B 51263 A 136 K 5/2	
R 4	1	1,803kΩ ±0,5%; 0,15W	B 51264 A 1,803 K 0,5/0,5	
R 5	1	3,826kΩ ±0,5%; 0,15W	B 51264 A 3,826 K 0,5/0,5	
R 6	1	6,098kΩ ±0,5%; 0,15W	B 51264 A 6,098 K 0,5/0,5	
	für Ausführung Rel 3 D 916c2a FOR MODEL			
		Metallschichtwiderstand METALLIZED LAYER-TYPE RESISTOR		
R 21	1	1,087kΩ ±0,2%; 1/8W	AT.E-1/8-1,087 K-0,2%	
R 22	1	969,2Ω ±0,2%; 1/8W	AT.E-1/8-969,2-0,2%	
R 23	1	863,8Ω ±0,2%; 1/8W	AT.E-1/8-863,8-0,2%	
R 24	1	769,9Ω ±0,2%; 1/8W	AT.E-1/8-769,9-0,2%	+
R 25	1	686,2Ω ±0,2%; 1/8W	AT.E-1/8-686,2-0,2%	
R 26	1	611,6Ω ±0,2%; 1/8W	AT.E-1/8-611,6-0,2%	
R 27	1	545,0Ω ±0,2%; 1/8W	AT.E-1/8-545,0-0,2%	

+ Fa. Elettronica Metal-Lux

Metallschichtwiderstand
METALLIZED LAYER-TYPE RESISTOR

für Ausführung Rel 3 D 916c2a
FOR MODEL

R 28	1	485,8Ω ±0,2%; 1/8W	AT.E-1/8-485,8-0,2%
R 29	1	432,9Ω ±0,2%; 1/8W	AT.E-1/8-432,9-0,2%
R 30	1	385,9Ω ±0,2%; 1/8W	AT.E-1/8-385,9-0,2%
R 31	1	343,9Ω ±0,2%; 1/8W	AT.E-1/8-343,9-0,2%
R 32	1	2,818kΩ ±0,2%; 1/4W	AT.E-1/4-2,818K-0,2%

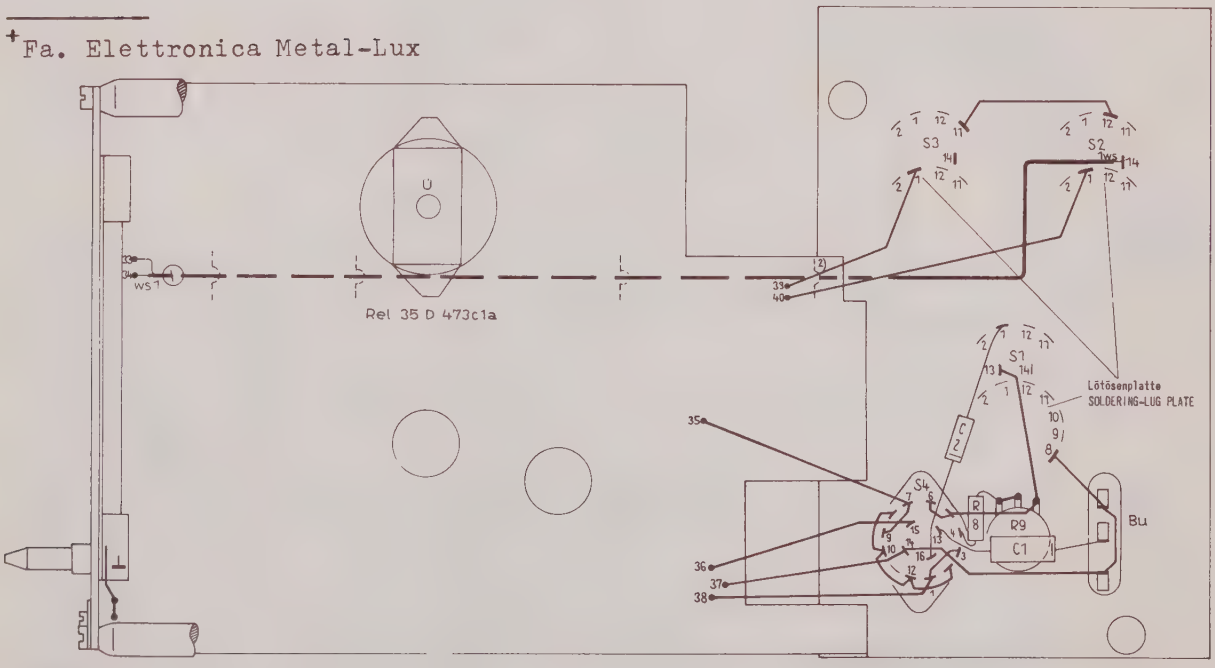
+

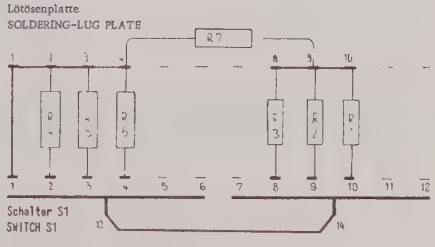
für Ausführung Rel 3 D 916c 1a,2a
FOR MODEL

Drehschalter
ROTARY SWITCH

S 1	1	2polig; 1 Ebene; 12stufig 2-POLE; 1 Deck; 12-STEP	Rel sch 176f Form B
S 2,3	2	1polig; 1 Ebene; 12stufig 1-POLE; 1 DECK; 12-STEP	Rel sch 175f Form B
S 4	1	-	Rel sch 304a, Form B

+ Fa. Elettronica Metal-Lux

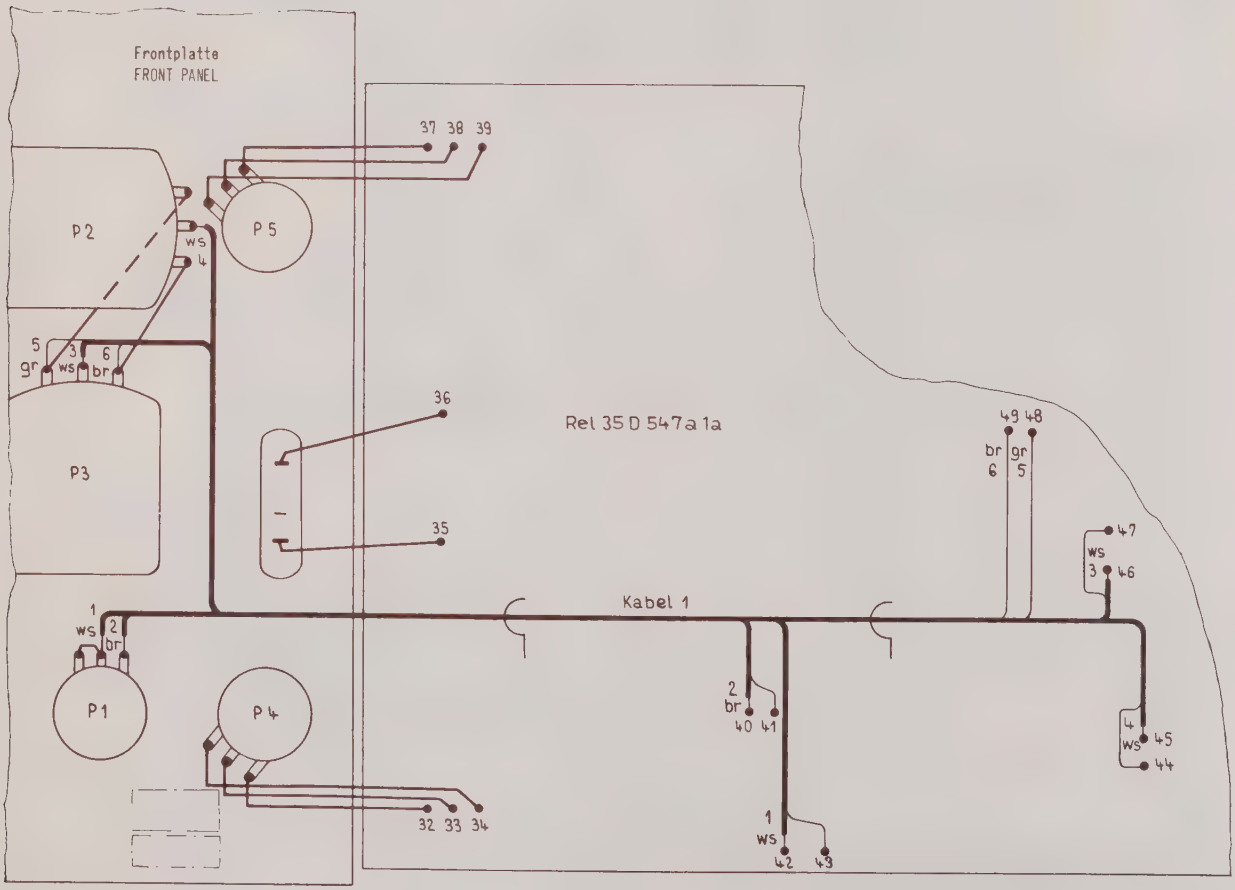




ZF-Verstärker Rel ms 3 D 916c 1a, 2a (Ausgabe II)
IF-AMPLIFIER Rel ms 3 D 916c 1a, 2a (ISSUE II)

Frequenzmarken-Einschub Rel 3 D 928a1a (Ausgabe III)
FREQUENZMARKER SLIDE-IN CHASSIS (ISSUE III)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRPTION	Bestellangabe ORDERING DATA	
	1	Verstärkerplatte AMPLIFIER BOARD	Rel Sk 35 D 547a1a	4.45
		Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR		
P 1	1	10kΩ +20/-30%; 0,2W	10 kΩ lin 9 Rel wd 10c	
P 2,3	2	100kΩ +20/-30%; 0,4W	100 kΩ lin Rel wd 152b	
P 4	1	100kΩ +20/-30%; 0,2W	100 kΩ lin 9 Rel wd 10c	
P 5	1	5kΩ +20/-30%; 0,2W	5 kΩ lin 9 Rel wd 10c	



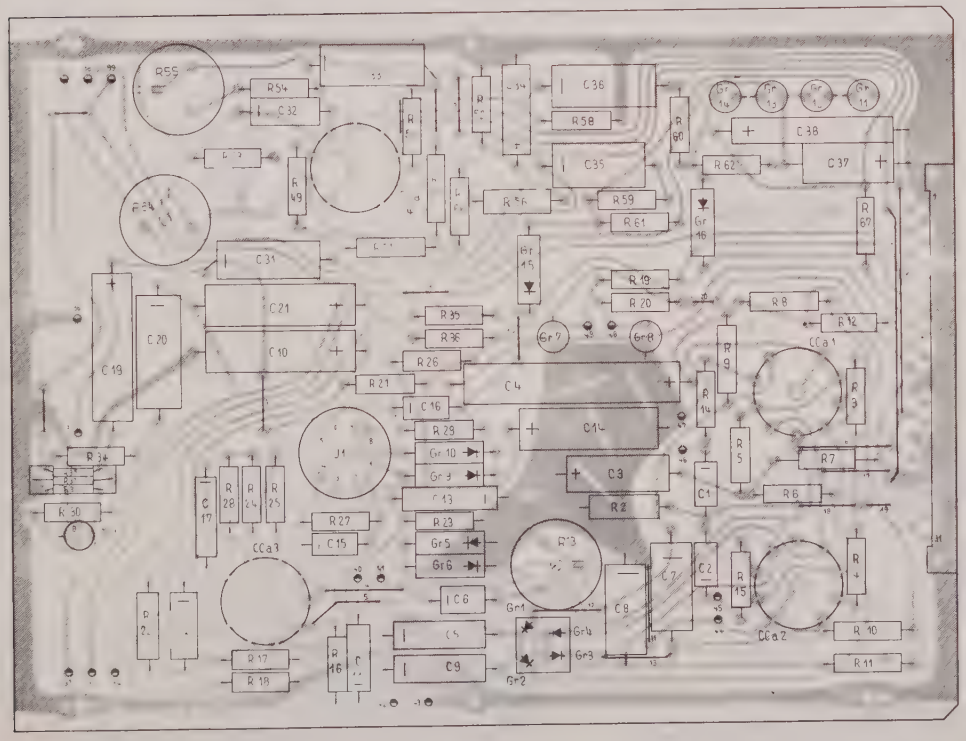
Frequenzmarken-Einschub Rel ms 3 D 928a1a (Ausgabe II)
FREQUENZMARKER SLIDE-IN-CHASSIS Rel ms 3 D 928a1a (ISSUE II)

Verstärkerplatte Rel 35 D 547a1a (Ausgabe IV)
AMPLIFIER BOARD (ISSUE IV)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA
C 1,2	2	Styroflex-Kondensator STYROFLEX CAPACITOR 1000pF ±10%; 125V	B31140-A1102-K
		Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR	
C 3,37	2	10µF +50/-20%; 35/40V	B41951-A7106-S
C 4	1	8µF +50/-10%; 150/165V	B43711-A1805-T
		Styroflex-Kondensator STYROFLEX CAPACITOR	
C 5	1	500pF ±20%; 500V	B31142-A5501-M
C 6,16	2	1000pF ±20%; 125V	B31140-A1102-M
C 7	1	5000pF ±20%; 125V	B31142-A1502-M
C 8	1	5000pF ±20%; 250V	B31142-A2502-M
C 9	1	1000pF ±20%; 500V	B31142-A5102-M
C 10,14,19 21	4	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 4µF +50/-10%; 150/165V	B43711-A1405-T
		Styroflex-Kondensator STYROFLEX CAPACITOR	
C 11	1	10pF ±1%; 500V	B31141-A5100-F
C 12	1	200pF ±20%; 500V	B31141-A5201-M
C 13,17	2	MKL-Kondensator MKL CAPACITOR 0,1µF ±20%; 100V	B32110-C0104-M
C 15	1	Styroflex-Kondensator STYROFLEX CAPACITOR 250pF ±5%; 125V	B31140-A1251-J
C 20	1	MKL-Kondensator MKL CAPACITOR 1µF ±20%; 160V	B32110-C1105-M
C 31,33	2	MKH-Kondensator MKH CAPACITOR 0,1µF ±20%; 300V	B32220-A3104-M
C 32	1	Styroflex-Kondensator STYROFLEX CAPACITOR 100pF ±20%; 500V	B31141-A5101-M
C 34	1	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 2µF +50/-20%; 35/40V	B41951-A7205-B

C 35,36	2	MKL-Kondensator MKL CAPACITOR 2,2µF ±20%; 63V	B32110-C9225-M
C 38	1	Elektrolyt-Kondensator ELECTROLYTIC CAPACITOR 1µF +50/-10%; 350/385V	B43711-A4105-T
Gr 1-6	6	Germanium-Diode GERMANIUM DIODE -	AAY 26
Gr 7,8	2	Silizium-Zenerdiode SILICON ZENER-DIODE J_Z=5mA; U_Z=11V; r_Z=20Ω	SZ 11 KB
Gr 9 10,15,16	4	Germanium-Diode GERMANIUM DIODE -	AAY 29
Gr 11-14	4	Silizium-Zenerdiode SILICON ZENER-DIODE J_Z=5mA; r_Z=40Ω; U_Z=6,2V	SZ 6 KB
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 2	1	1MΩ ±5%; 0,33W	B 51264 A 1 M 5/2
R 3,4,7,14,15 17,25,49, 50 67	10	100Ω ±5%; 0,25W	B 51263 A 100 Ω 5/2
R 5,6,54	3	4kΩ ±5%; 0,25W	B 51263 A 4 K 5/2
R 8,9,10 11,22	5	10kΩ ±5%; 0,33W	B 51264 A 10 K 5/2
R 12	1	500Ω ±5%; 0,25W	B 51263 A 500 Ω 5/2
R 13	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 10kΩ +20/-30%; 0,1W	10 kΩ lin Rel wd 146d
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 16,34	2	10kΩ ±5%; 0,25W	B 51263 A 10 K 5/2
R 18	1	100kΩ ±5%; 0,25W	B 51263 A 100 K 5/2
R 19,29	2	50kΩ ±5%; 0,25W	B 51263 A 50 K 5/2
R 20	1	12kΩ ±5%; 0,25W	B 51263 A 12 K 5/2
R 21	1	2kΩ ±5%; 0,25W	B 51263 A 2 K 5/2
R 23,28	2	250Ω ±5%; 0,25W	B 51263 A 250 Ω 5/2
R 24	1	200kΩ ±5%; 0,25W	B 51263 A 200 K 5/2
R 26,53 58,66	4	5kΩ ±5%; 0,25W	B 51263 A 5 K 5/2
R 27	1	1kΩ ±5%; 0,25W	B 51263 A 1 K 5/2
R 32	1	22kΩ ±5%; 0,25W	B 51263 A 22 K 5/2

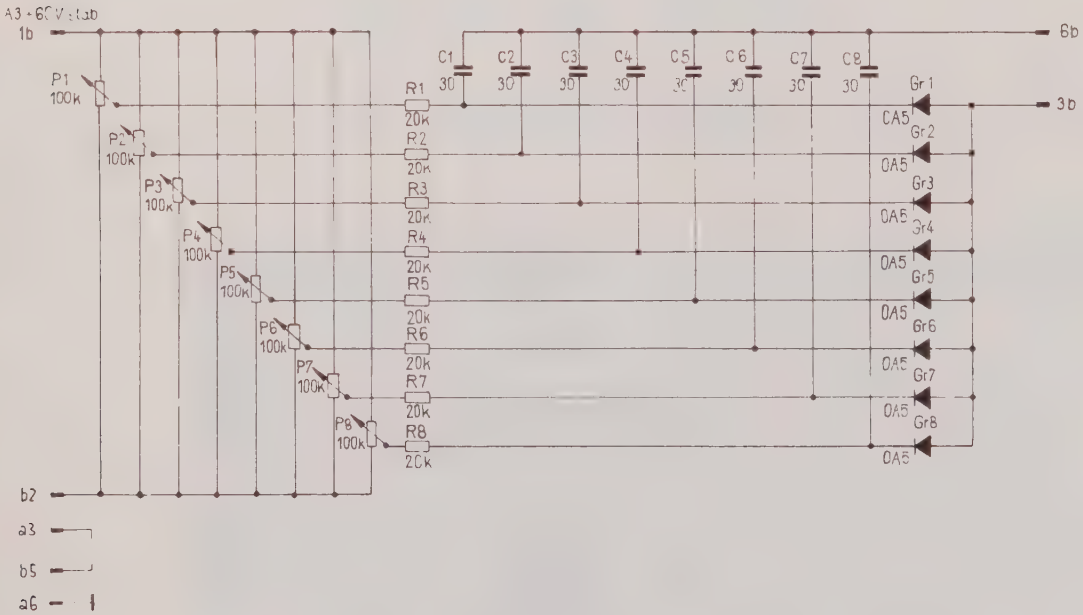
		Schichtwiderstand LAYER-TYPE RESISTOR	
R 30,33	2	3,3kΩ ±5%; 0,25W	B 51263 A 3,3 K 5/2
R 31,61,62	3	20kΩ ±5%; 0,25W	B 51263 A 20 K 5/2
R 35	1	12kΩ ±5%; 0,25W	B 51263 A 12 K 5/2
R 36	1	60kΩ ±5%; 0,25W	B 51263 A 60 K 5/2
R 51,57	2	500kΩ ±5%; 0,33W	B 51264 A 500 K 5/2
R 52	1	30kΩ ±5%; 0,25W	B 51263 A 30 K 5/2
R 56	1	400kΩ ±5%; 0,33W	B 51264 A 400 K 5/2
R 59,60	2	800Ω ±5%; 0,25W	B 51263 A 800 Ω 5/2
R 55	1	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 1kΩ +20/-30%; 0,1W	1 kΩ lin Rel wd 146d
R 64	1	5kΩ +20/-30%; 0,1W	5 kΩ lin Rel wd 146d
Ts 1	1	Transistor TRANSISTOR	ASY 37
Ü	1	Übertrager (9 Rel sp 5n) TRANSFORMER Wicklg. I (1,4) 20 Wdg 0,40 Cu2L 0,12Ω 280...530µH Wicklg. II (5,6,7) 40 Wdg 0,28 Cu2L 0,48Ω 1. Abgriff (6): 20 Wdg	Rel Bv 622 N 3447

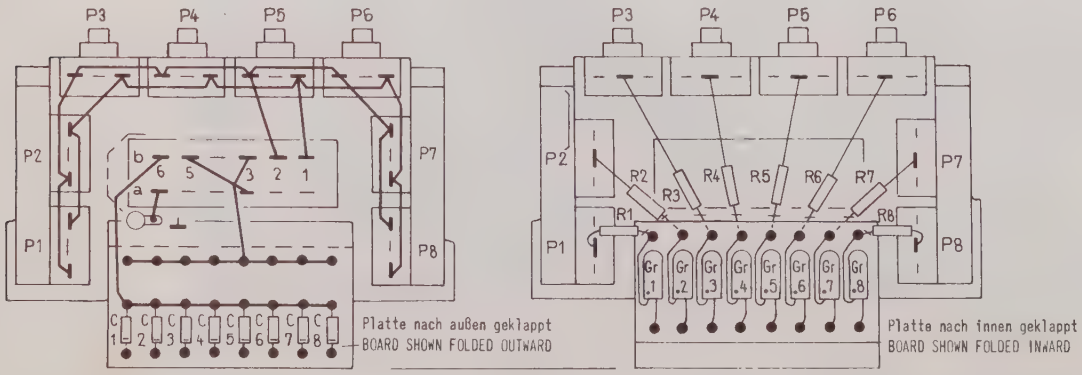


Verstärkerplatte Rel ms 35 D 547 a 1a (Ausgabe III)
AMPLIFIER BOARD Rel ms 35 D 547 a 1a (ISSUE III)

Rastgeber Rel 3 B 945a1a (Ausgabe I)
LEVEL PATTERN SENDER (ISSUE I)

Symbol SYMBOL	Stck QTY	Gegenstand DESCRIPTION	Bestellangabe ORDERING DATA
C 1-8	8	Styroflex-Kondensator STYROFLEX CAPACITOR 30pF ±1pF; 125V	B31140-A1300-F
Gr 1-8	1	Germanium-Diode GERMANIUM DIODE J_D = 200mA; U_{Sp} = 100 V	OA 5 (Fa. Valvo)
P 1-8	8	Schichtdrehwiderstand LAYER-TYPE VAR RESISTOR 100kΩ +20/-30%; 0,1W	100 kΩ lin Rel wd 165a
R 1-8	8	Schichtwiderstand LAYER-TYPE RESISTOR 20kΩ ±5%; 0,15W	B 51262 A 20 K 5/2





Rastgeber Rel str, ms 3 B 945a1a (Ausg. I)
LEVEL PATTERN SENDER Rel str, ms 3 B 945a1a (ISSUE I)

SIEMENS

Ix 85 mA

Sagezahn u. Horizontalverst.
Rel 35 D 436
SAWTOOTH AND HORIZONTAL AMPL.

Hochspannungsteil Rel 35D433
HIGH-VOLTAGE SECTION

Gleichspannungsverstärker
Rel 35 D 434
DC AMPLIFIER

Differenzierverstärker
Rel 35D435
DIFFERENTIATING AMPLIFIER

Bu1 Steuerltg a
CONTROL LINE

X-Ablenkung b
HORIZONTAL DEFLECTION

Bu 2
Schreiber
GRAPHIC RECORDER

Eingang +
INP. +

Eingang −
INP. −

Eingang 0
INP. 0

Dehnung hor.

Position hor

Dehnung vert.
EXPANSION VERTICAL

POSITION VERTICAL Position vert.

Helligkeit
BRIGHTNESS

FOCUSSING Fokussierung

Rel 35 D 433

ac Rel 35D433

ac Rel 35D436

siehe Blatt 2
SEE SHEET 2

10 W P 19 A

GR1 OA 182

300E Reg Fwd.
INF. Rev.

Pegelbildgerät
LEVEL TRACER

Rel str 3 D 346b1a Bl.1 dt/en

Ausg. III 10.1.66 Brehmer

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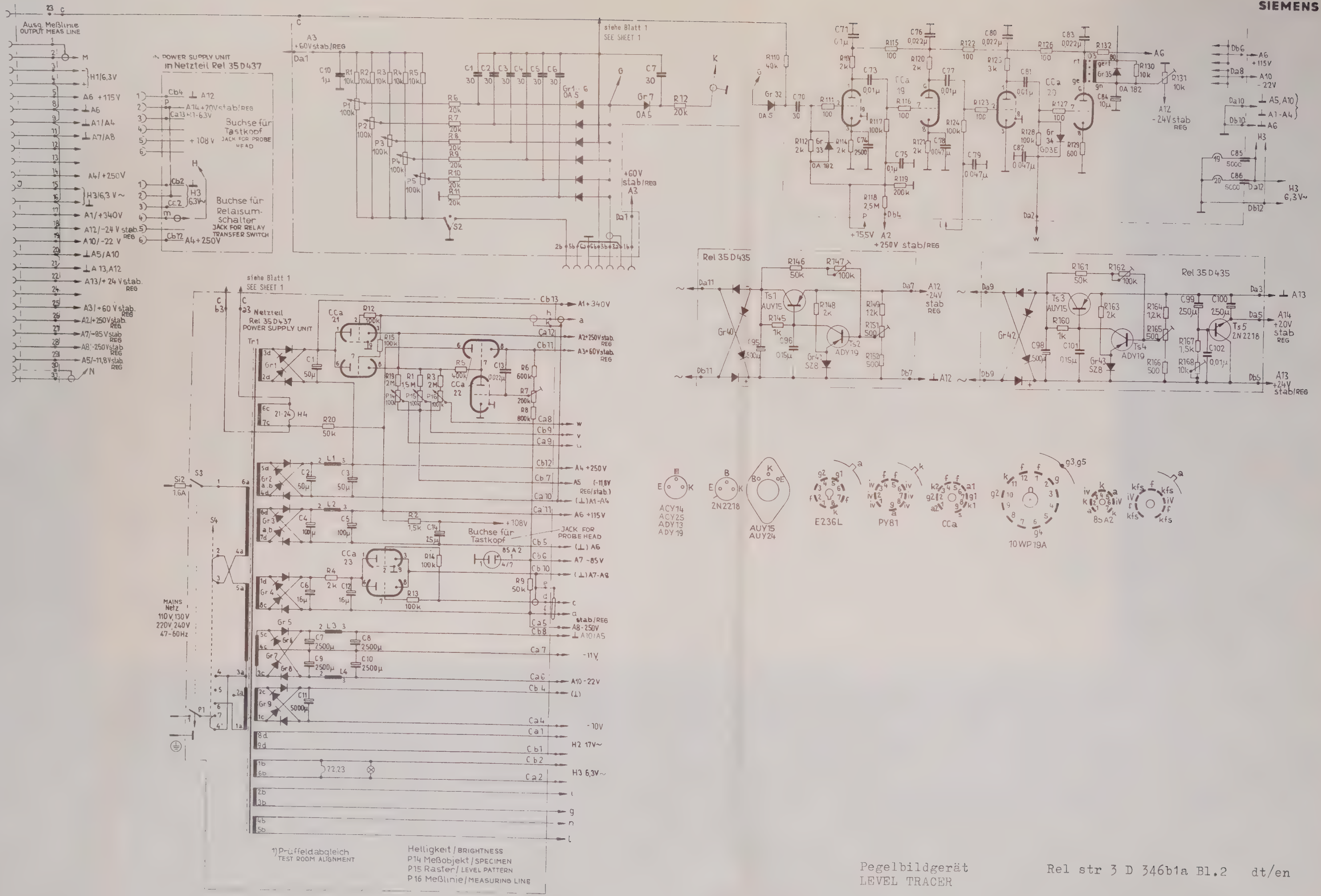

Pegelbildgerät
LEVEL TRACER

Rel str 3 D 346b1a Bl.2 dt/en

Ausg. III 19.1.66 Brehmer

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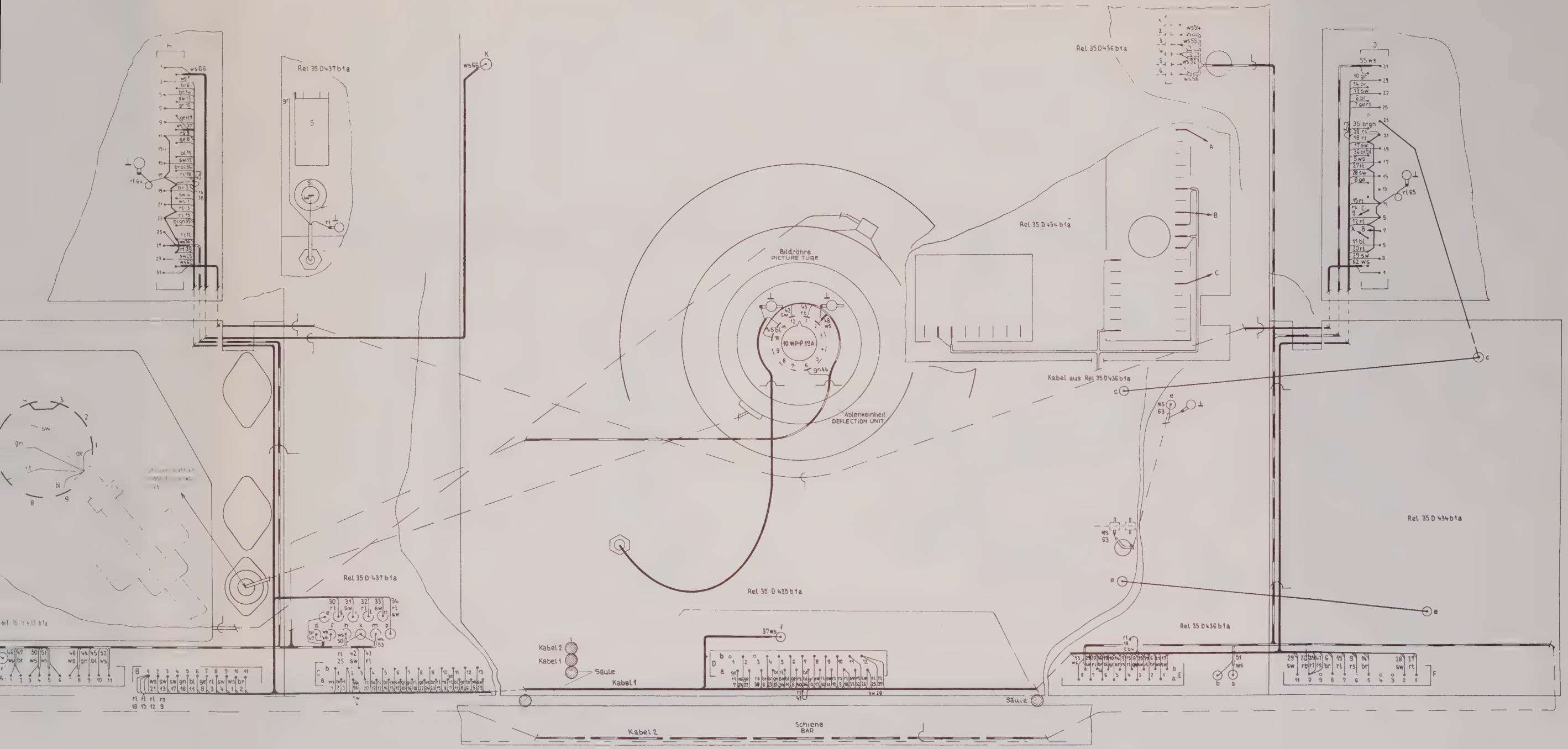
SIEMENS



Pegelbildgerät
LEVEL TRACER

Rel ms 3 D 346b1a

dt/en

Ausg. III 10.1.66 Brehmer

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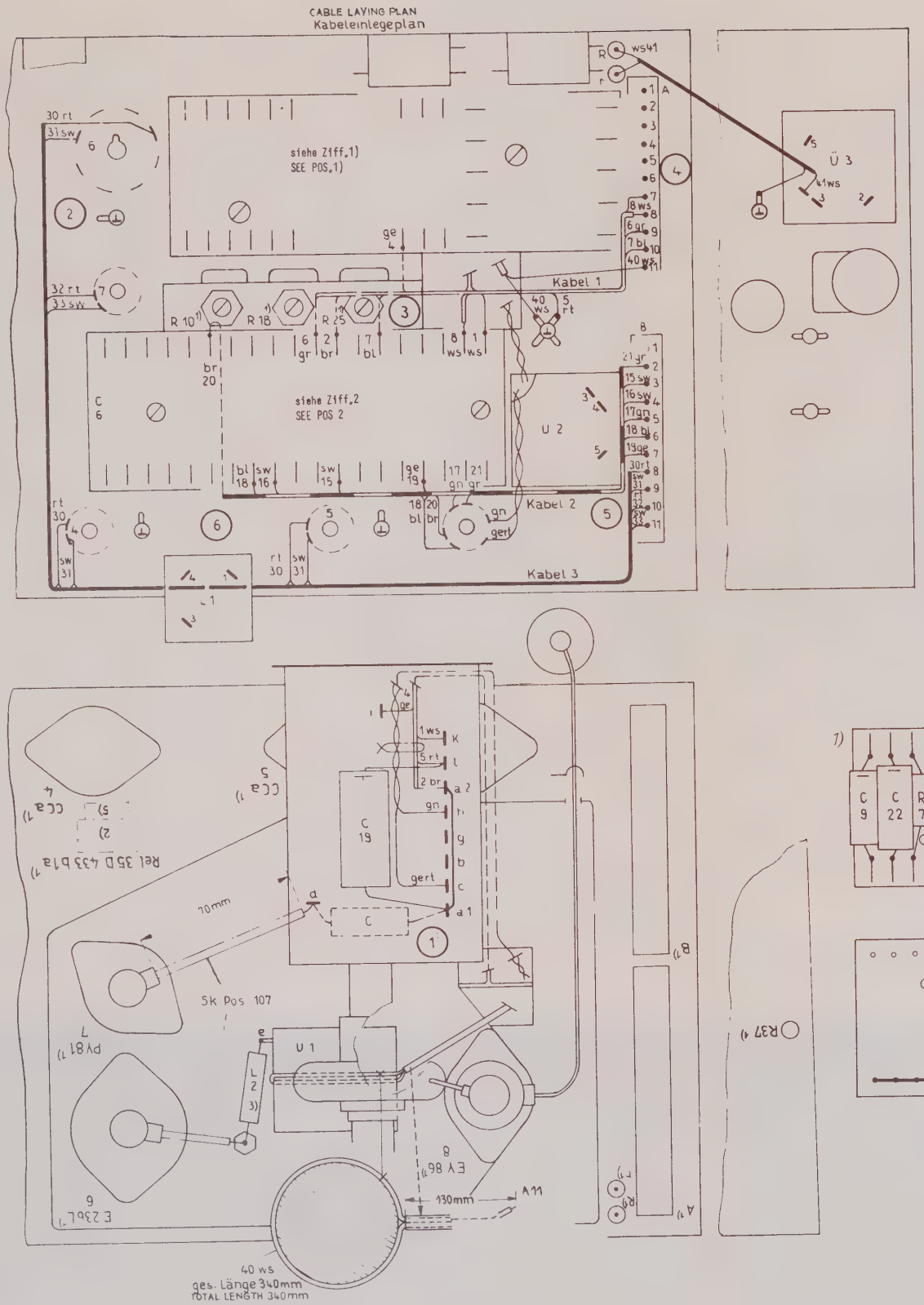
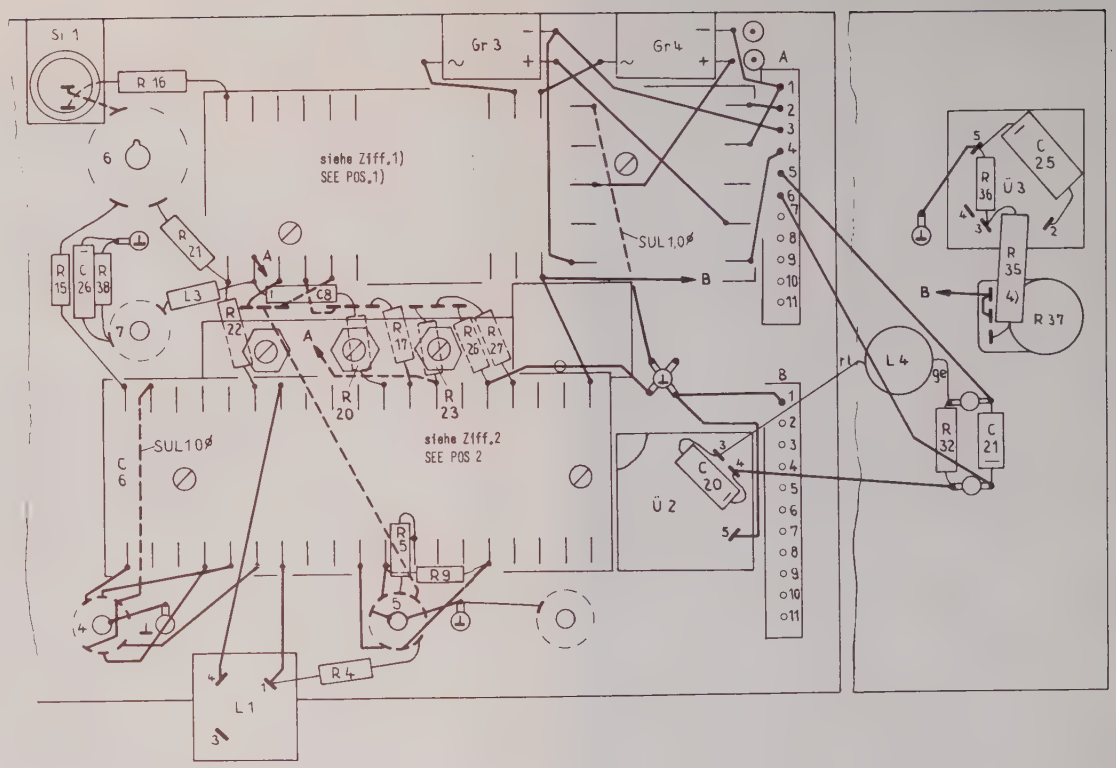
CABLE LAYING PLAN
Kabeleinlegeplan





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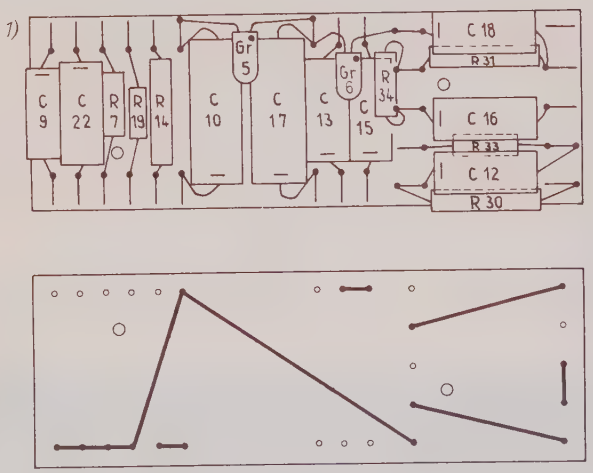

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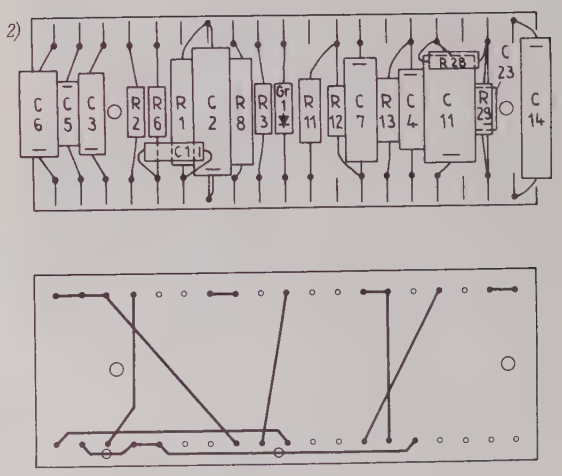

Hochspannungsteil
HIGH-VOLTAGE SECTION

Rel ms 35 D 433b1a dt/en

Ausg. III 10.1.66 Brehmer

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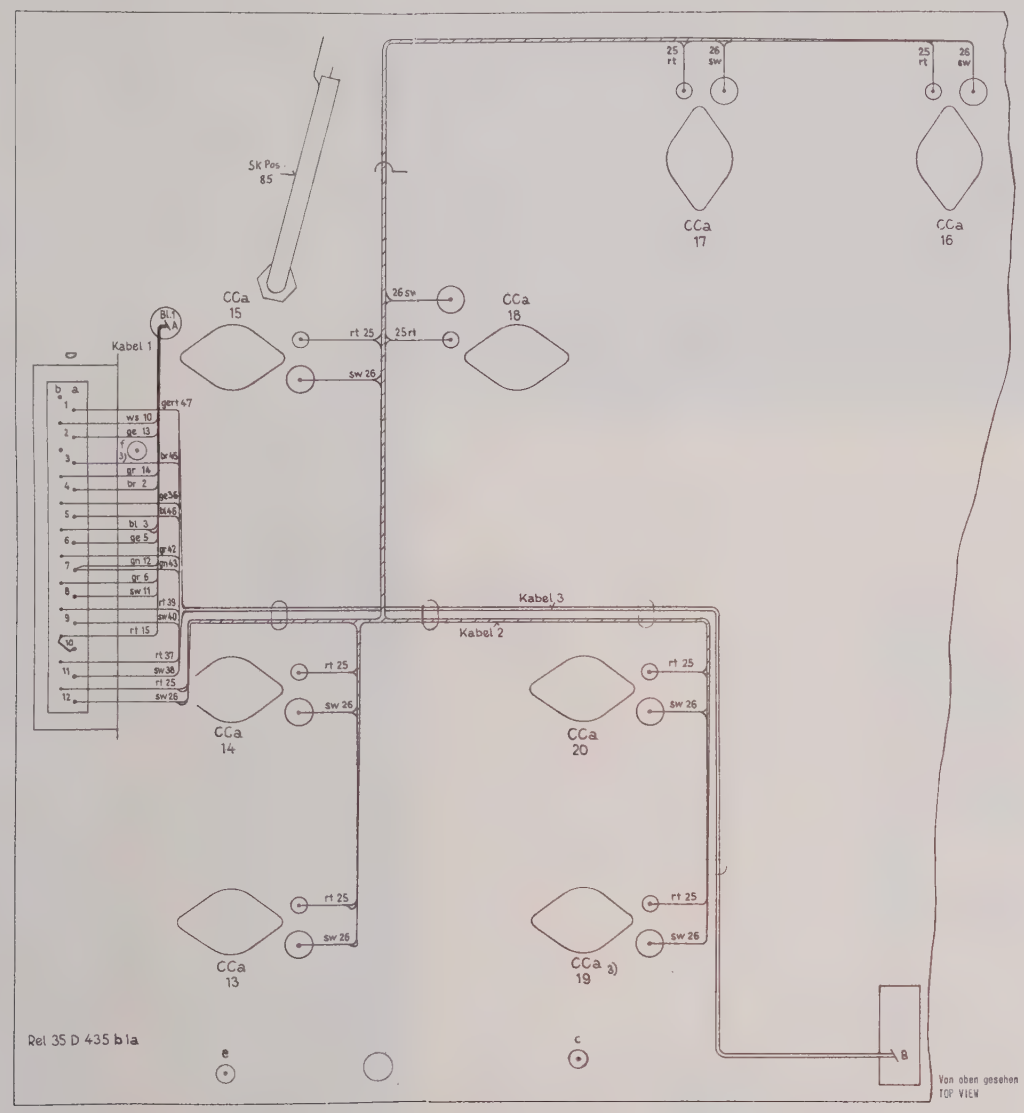

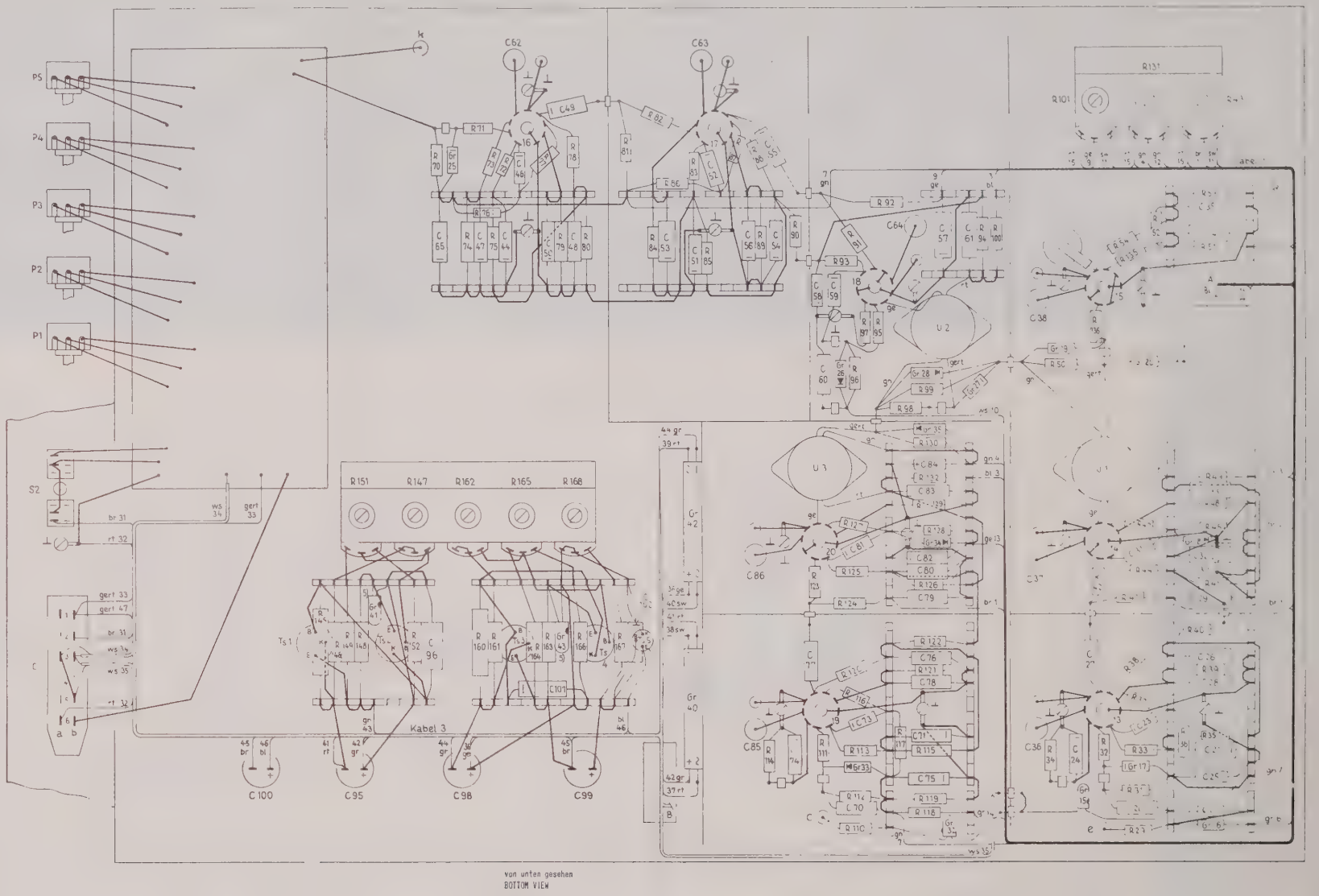

Differenzierverstärker
DIFFERENTIANTING AMPLIFIER

Rel ms 35 D 435b1a dt/en

Ausg.IV 10.1.66 Brehmer

Vervielfältigung dieser Unterlage sowie Verwertung und Mitteilung ihres Inhaltes unzulässig, soweit nicht ausdrücklich zugestanden. Zuwiderhandlungen sind strafbar und verpflichten zu Schadenersatz (LitUrhG, UWG, BGB). Alle Rechte für den Fall der Patenterteilung oder GM-Eintragung vorbehalten.

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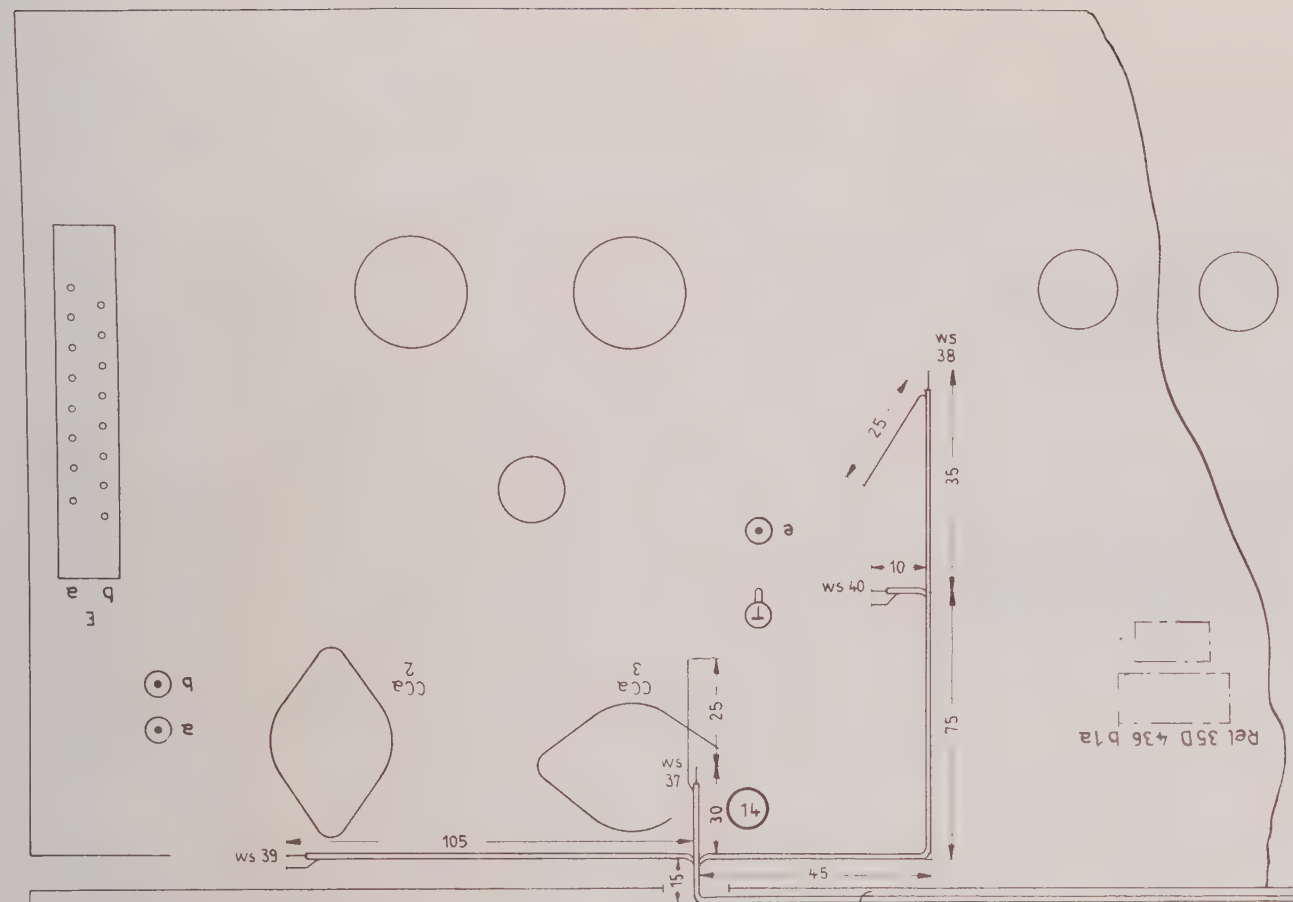

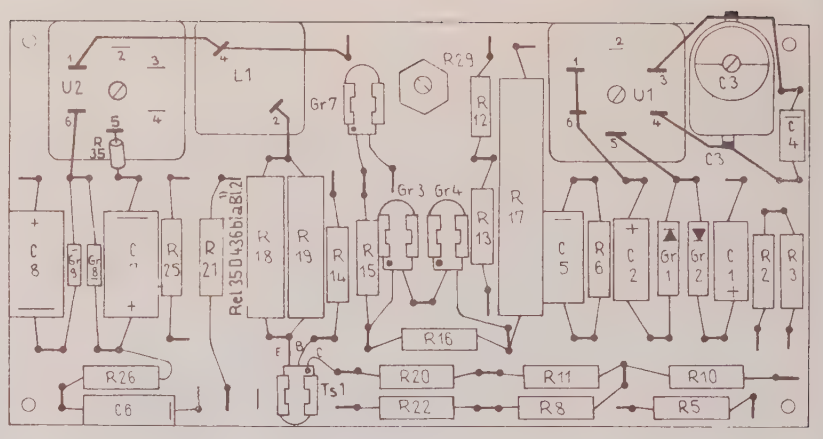

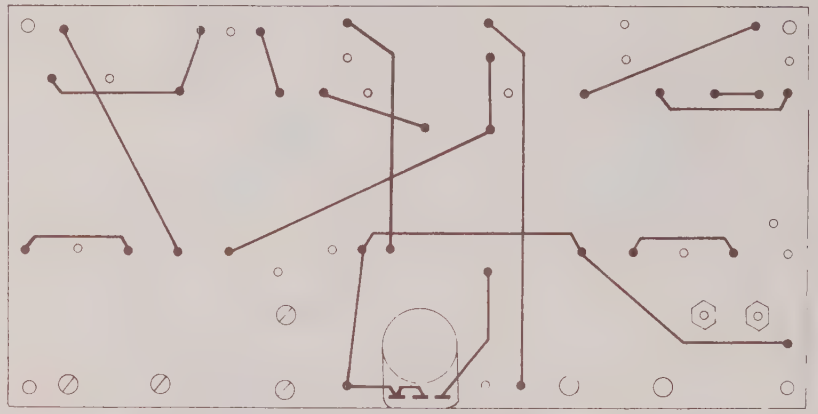

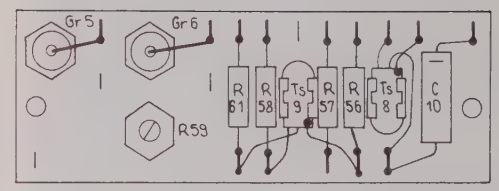

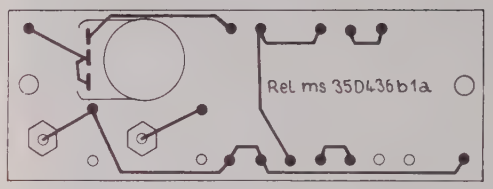

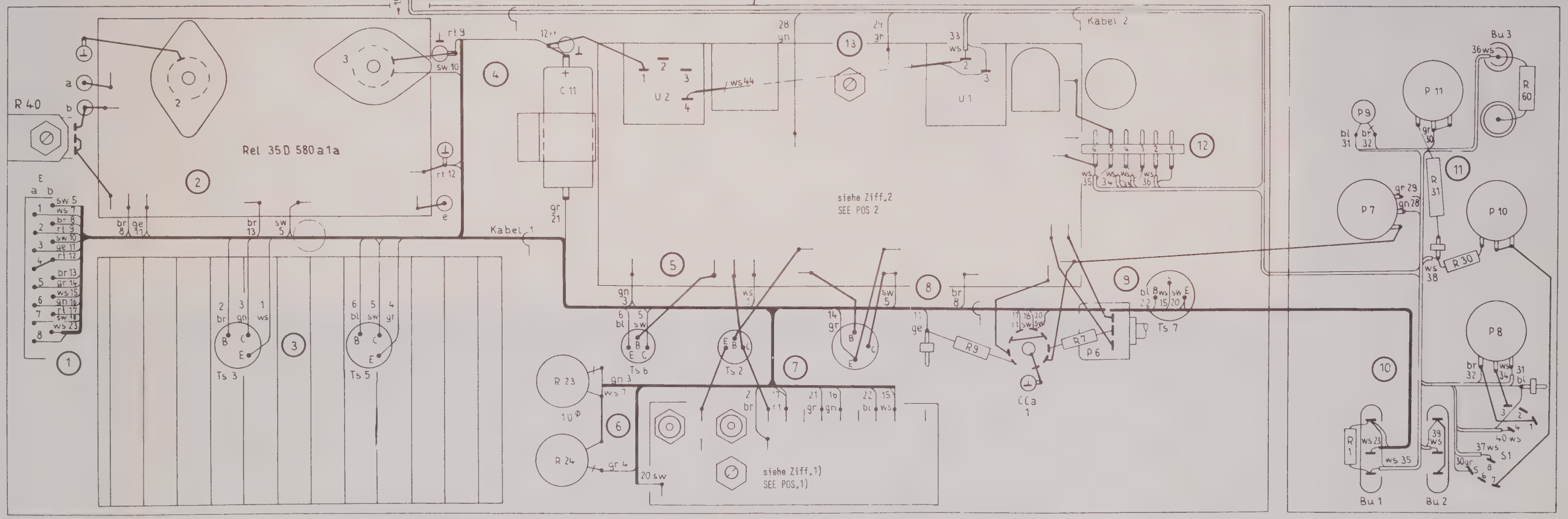

Sägezahn- und Horizontalverstärker
SAWTOOTH AND HORIZONTAL AMPLIFIER

Rel ms 35 D 436b1a dt/en

Ausg.IV 10.1.66 Brehmer

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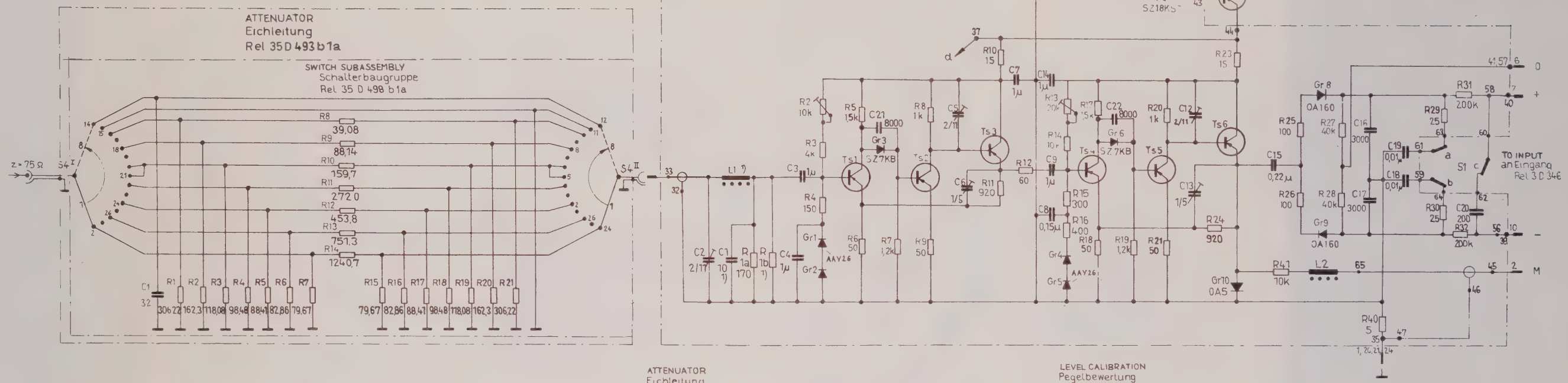
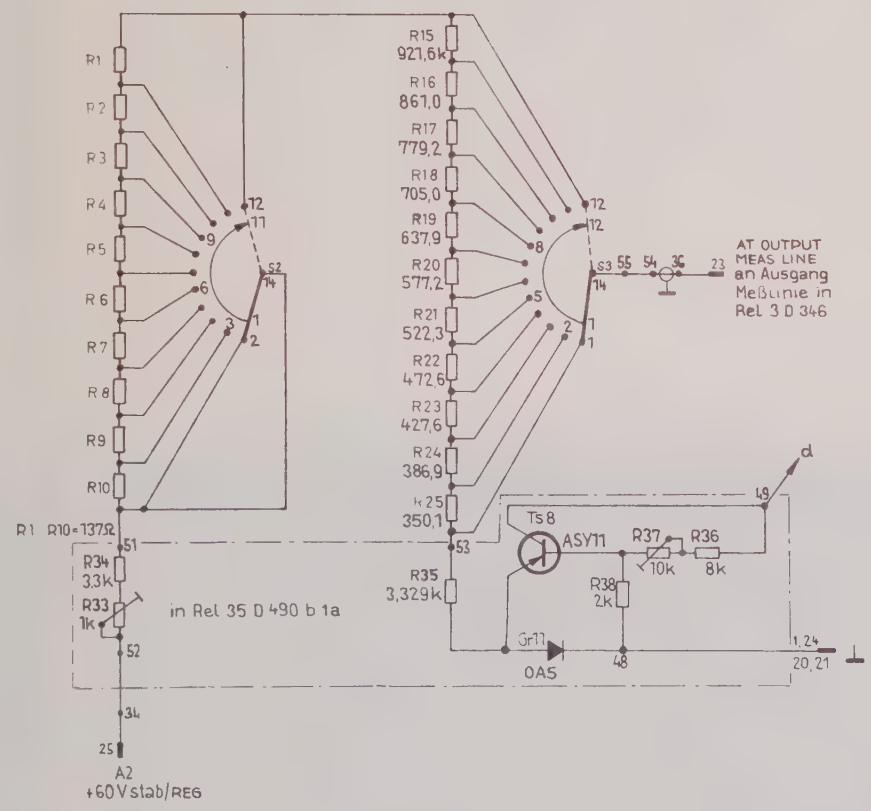




ATTENUATOR
Eichleitung
S

Stellg. POS	Np
1	-1,0
2	-1,5
3	-2,0
4	-2,5
5	-3,0
6	-3,5
7	-4,0
8	-4,5 ▼II

S1

Stellg. POS	fu=
1	10kHz ▼II
2	100kHz

LEVEL CALIBRATION
Pegelbewertung

S2

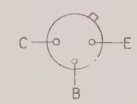
Stellg. POS	Np
1	-0,05
2	-0,04
3	-0,03
4	-0,02
5	-0,01
6	0 ▼II
7	+0,01
8	+0,02
9	+0,03
10	+0,04
11	+0,05

S3

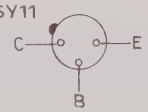
Stellg. POS	Np
1	-1,0
2	-0,9
3	-0,8
4	-0,7
5	-0,6
6	-0,5
7	-0,4
8	-0,3
9	-0,2
10	-0,1 ▼II
11	0
12	+0,1

1) TEST ROOM ALIGNMENT
1) Prüffeldabgleich

Ts1 Ts6 = 2N1143 (Fa Texas)



Ts7 = ADY12
Ts8 = ASY11



Breitbandverstärker 10 kHz bis 17 kHz Rel str 3 D 917b1a dt/en
WIDEBAND AMPLIFIER 10 KC/S TO 17 MC/S

Ausg. II 18.8.65 Brehmer

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ATTENUATOR
Eichleitung
Rel 35D 493 b2a

SWITCH SUBASSEMBLY
Schalterbaugruppe
Rel 35 D 498 b2a

Z = 75 Ω

R8 45,59
R9 106,6
R10 204,2
R11 371
R12 664,73
R13 1183
R14 2108

C1 3,2
R1 267,76
R2 74,45
R3 107,44
R4 91,65
R5 83,94
R6 79,87
R7 77,72
R15 77,72
R16 79,87
R17 83,94
R18 91,65
R19 107,44
R20 144,5
R21 267,76

AMPLIFIER BOARD
Verstärkerplatte
Rel 35D 490 b2a,3a

A10
24
C10 25µ
C11 0,22µ
R22 1,5k
Gr7 SZ18KS
Ts7 ADY12
R23 15
R10 15
C7 1µ
C14 1µ
R13 20k
R14 10k
R15 300
R16 400
R18 50
R19 1,2k
R21 50
C22 3000
C12 2/11
R20 1k
Ts6
C15 0,22µ
R24 2)
Gr10 OA5
R47 10k
L2
R40 5
1,20,21
Gr8 OA160
R25 100
R27 40k
C16 3000
R29 200k
R31 25
C19 0,01µ
R26 100
R28 40k
C17 3000
R30 25
C20 200
R32 200k
Gr9 OA160
S1
TO INPUT
im Eingang
Rel 3D 346
R2 10k
R5 15k
C21 8000
Gr3 Z7
R8 1k
C5 2/11
Ts3
R3 4k
Ts1
Ts2
R12 60
C9 1µ
C6 1/5
R11 1)
R4 150
Gr1
R6 50
R7 1,2k
R9 50
C2 2/11
C1 10 1)
R 1a 170
R 1b 1) 1)
C4 1µ
Gr2 AAY26
C3 1µ
L1 1)
Gr4
Gr5 AAY26
C8 0,15µ
Ts4
Ts5
Z7
Gr6
33
32
37
a
41,57,6
0
+
40
39
M
45
2
46
47
65
58
60
64
62
56
10
C
D
a
b

ATTENUATOR
Eichleitung
S4

Stellg POS	dB	dBm
1	-5	+5
2	-10	0
3	15	-5
4	-0	-10
5	-5	-15
6	-30	-20
7	-35	-25
8	-40 ▼II	-30

S1

Stellg POS	fu =
1	10kHz ▼II
2	100kHz

Pegelbewertung
LEVEL CALIBRATION

S2

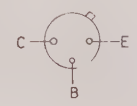
Stellg POS	dB
1	- 0,5
2	- 0,4
3	- 0,3
4	- 0,2
5	- 0,1
6	0 ▼II
7	+ 0,1
8	+ 0,2
9	+ 0,3
10	+ 0,4
11	+ 0,5

S3

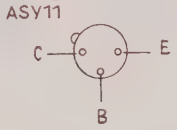
Stellg POS	dB	dBm
1	10	10
2	9	9
3	8	8
4	7	7
5	6	6
6	5	5
7	4	4
8	3	3
9	2	2
10	1	1 ▼II
11	0 ▼II	0
12	+ 1	+1

R1 - R10 = 167Ω
R15 1,087k
R16 969,2
R17 863,8
R18 769,9
R19 686,2
R20 611,6
R21 545
R22 485,8
R23 432,9
R24 385,9
R25 343,9
R35 2,818k
R34 3k
R33 1k
in Rel 35 D 490 b2a,3a
Gr11 OA5
Ts8 ASY11
R37
R36 10k 8k
R38 2k
TO OUTPUT
MEAS LINE
an Ausgang
Meßlinie in
Rel 3 D 346
A2
+60V stab/REG

Ts1-Ts6 = 2N1143 (Fa Texas)



Ts7 = ADY12
Ts8 = ASY11



1) TEST ROOM ALIGNMENT
1) Prüffeldabgleich
2) für Ausführung b 2a (dB) 920Ω
für Ausführung b 3a (dBm) 860Ω

Breitbandverstärker 10 kHz bis 17 MHz Rel str 3 D 917b2a,3a dt/en
WIDEBAND AMPLIFIER 10 KC/S TO 17 MC/S

Ausg.II 18.8.65 Brehmer

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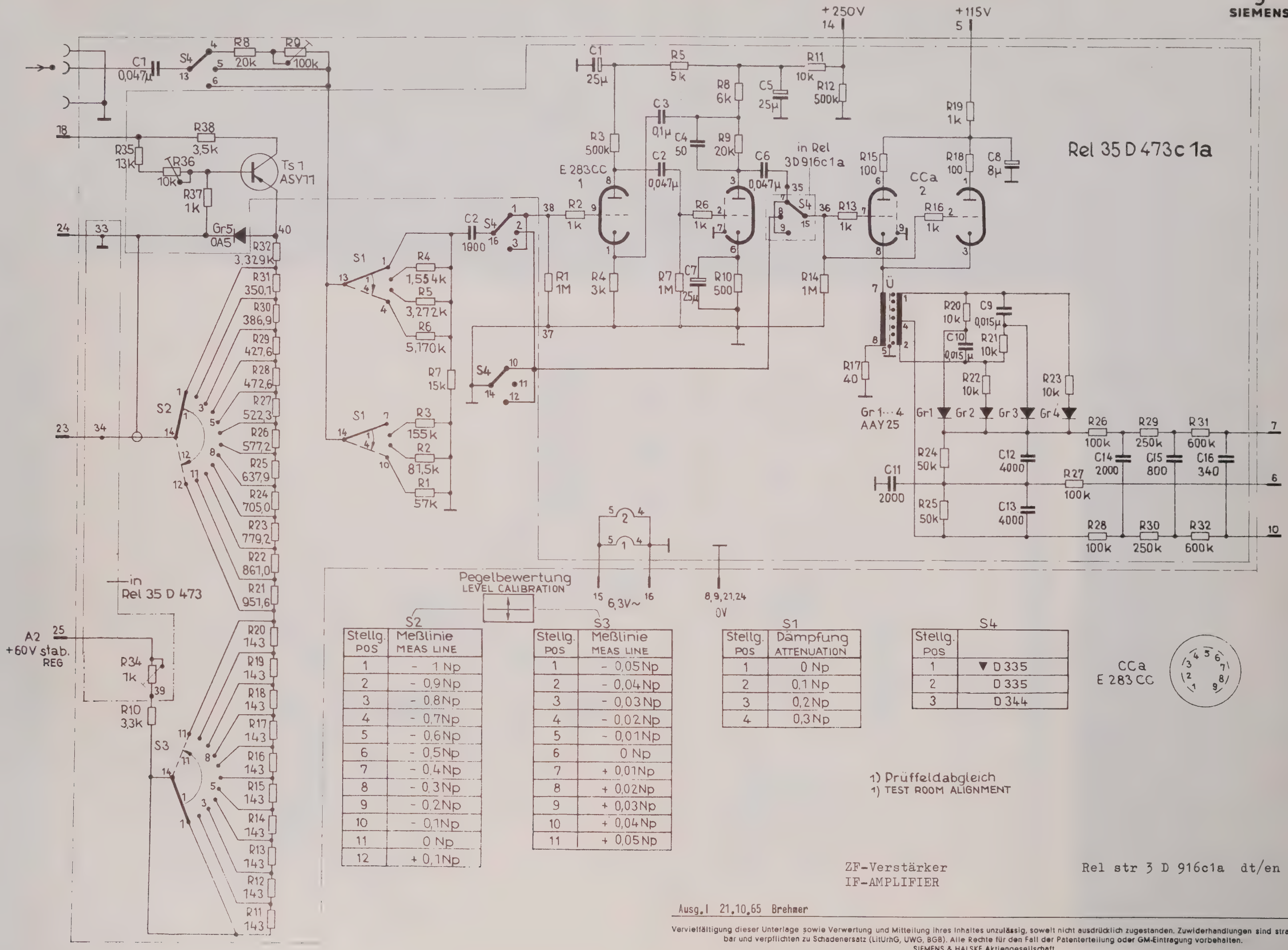
Z = 75 Ω

SIEMENS

Rel 35 D 473c 1a



Pegelbewertung
LEVEL CALIBRATION

S2

Stellg. POS	Meßlinie MEAS LINE
1	- 1 Np
2	- 0,9 Np
3	- 0,8 Np
4	- 0,7 Np
5	- 0,6 Np
6	- 0,5 Np
7	- 0,4 Np
8	- 0,3 Np
9	- 0,2 Np
10	- 0,1 Np
11	0 Np
12	+ 0,1 Np

S3

Stellg. POS	Meßlinie MEAS LINE
1	- 0,05 Np
2	- 0,04 Np
3	- 0,03 Np
4	- 0,02 Np
5	- 0,01 Np
6	0 Np
7	+ 0,01 Np
8	+ 0,02 Np
9	+ 0,03 Np
10	+ 0,04 Np
11	+ 0,05 Np

S1

Stellg. POS	Dämpfung ATTENUATION
1	0 Np
2	0,1 Np
3	0,2 Np
4	0,3 Np

S4

Stellg. POS	
1	▼ D 335
2	D 335
3	D 344

CCa
E 283 CC

1) Prüffeldabgleich
1) TEST ROOM ALIGNMENT

ZF-Verstärker
IF-AMPLIFIER

Rel str 3 D 916c1a dt/en

Ausg. I 21.10.65 Brehmer

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SIEMENS

Rel 35 D 473 c 2a

+250V 14 · +115V 5

C1 0,047µ · S4 · R8 20k · R9 100k

18 · R38 3,5k · R35 13k · R36 10k · R37 1k · Ts1 ASY11

24 · 33 · Gr5 0A5 · 40 · R32 2,818k

R31 343,9 · R30 385,9 · R29 432,9 · R28 485,8 · R27 545,0 · R26 611,6 · R25 686,2 · R24 769,9 · R23 863,8 · R22 969,2 · R21 1,087k

23 · 34 · S2

in Rel 35 D 473

A2 25 +60V stab. REG · R34 1k · 39 · R10 3k · S3

R20 174 · R19 174 · R18 174 · R17 174 · R16 174 · R15 174 · R14 174 · R13 174 · R12 174 · R11 174 · 12

C2 1000 · S4 · 38 · 37

S1 · R4 1,803k · R5 3,826k · R6 6,098k · R7 15k

S1 · R3 136k · R2 70k · R1 50k

C1 25µ · R5 5k · R8 6k · C5 25µ · R11 10k · R12 500k

C3 0,1µ · C4 50 · R9 20k · R3 500k · C2 0,047µ · C6 0,047µ · in Rel 3D916c2a

E 283CC 1 · R2 1k · R6 1k · R1 1M · R4 3k · R7 1M · C7 25µ · R10 500 · R14 1M

S4 · 35 · 36 · R13 1k · 15

R19 1k · R15 100 · R18 100 · C8 8µ · CCa 2 · R16 1k

Ü · R17 40 · R20 10k · C9 0,015µ · C10 0,015µ · R21 10k · R22 10k · R23 10k

Gr 1 ··· 4 AAY25 · Gr1 · Gr2 · Gr3 · Gr4

R26 100k · R29 250k · R31 600k · 7

R24 50k · C12 4000 · C14 2000 · C15 800 · C16 340

C11 2000 · R27 100k · 6

R25 50k · C13 4000 · R28 100k · R30 250k · R32 600k · 10

5 2 4 · 5 1 4 · 15 6,3V~ 16 · 8,9,21,24 0V

Pegelbewertung
LEVEL CALIBRATION

S2

Stellg. POS	Meßlinie MEAS LINE
1	-10 dB
2	- 9 dB
3	- 8 dB
4	- 7 dB
5	- 6 dB
6	- 5 dB
7	- 4 dB
8	- 3 dB
9	- 2 dB
10	- 1 dB
11	0 dB
12	+ 1 dB

S3

Stellg. POS	Meßlinie MEAS LINE
1	- 0,5 dB
2	- 0,4 dB
3	- 0,3 dB
4	- 0,2 dB
5	- 0,1 dB
6	0 dB
7	+ 0,1 dB
8	+ 0,2 dB
9	+ 0,3 dB
10	+ 0,4 dB
11	+ 0,5 dB

S1

Stellg. POS	Dämpfung ATTENUATION
1	0 dB
2	1 dB
3	2 dB
4	3 dB

S4

Stellg. POS	
1	▼ D335
2	D335
3	D344

CCa E 283 CC

1) Prüffeldabgleich
1) TEST ROOM ALIGNMENT

ZF-Verstärker
IF-AMPLIFIER

Rel str 3 D 916c2a dt/en

Ausg. I 21.10.65 Brehmer

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Frequenzmarken-Einschub
FREQUENCY MARKER DLIDE-IN CHASSIS

Rel str 3 D 928a dt/en

Ausg.11 19.1.65 Brehmer

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